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Rock Products

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Chicago, October 11, 1930 | Issued Every Other Week | Volume XXXIII, No. 21

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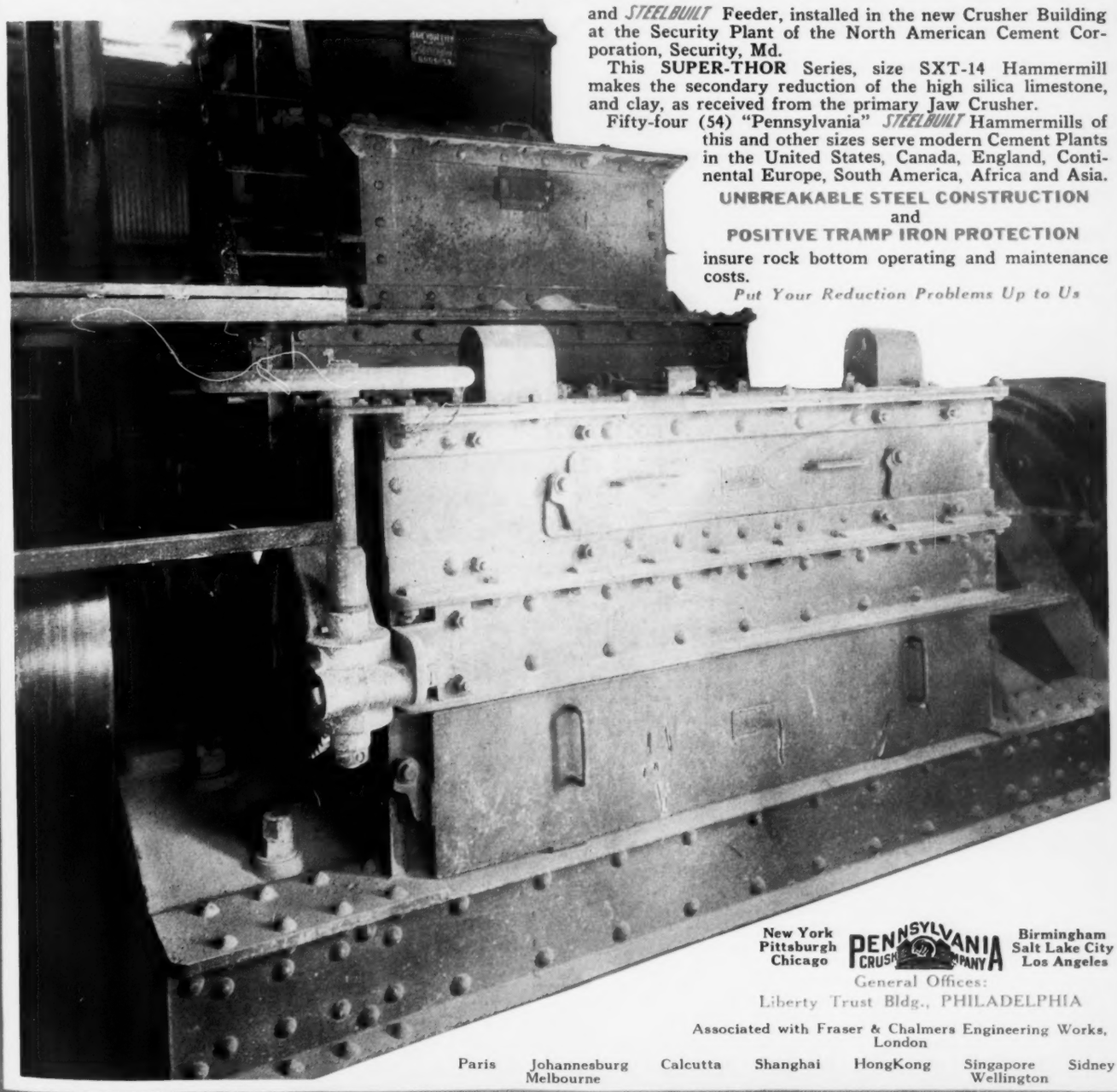

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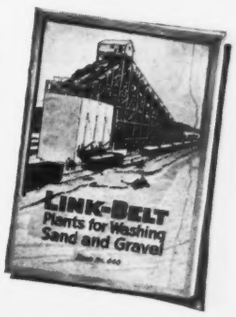

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Contents for October 11, 1930

Crushed Stone Producer, Noted for Originality, Builds Sand Plant.....41-45
John H. Odenbach, Dolomite Products Co., Rochester, N. Y., builds a plant using an overhead traveling crane to do all the handling of finished product, and a pump to bring material from pit to plant.

Gypsum and Gypsum Products Manufacture.....46-48
Part IV—Regulation of setting time, changes caused by hotpit storage, effects of bin storage, devices for preventing kettle leaks, kettle peculiarities. By S. G. McAnally.

Status of the Sand and Gravel Industry in North-Central Illinois.....49-57
Six typical plants can produce some two million tons annually. By Earl C. Harsh.

Researches on the Rotary Kiln in Cement Manufacture.....58-59
Part V—The size of the clinkering zones of rotary cement kilns necessary for a given output calculated from thermodynamic data—Temperature required for making clinker. By Geoffrey Martin.

Pennsylvania Lime Producers Learn Readjustment..60-64
Prospering, at least moderately, in spite of depression. The White Rock Quarries an example. By W. B. Lenhart.

Study of a Group of Crushing Plants in the Central West.....65-68
Part III—Drilling and blasting operations.

A Suggested Method for Proportioning and Determining the Composition of Cement Slurries.....70-71
By Tyrrell B. Shertzer.

Report of the National Safety Congress, Cement and Quarry Section Meetings.....84-91

Aids in Handling Oneself and Others, Especially in Relation to Accident Prevention and Safety.....91-94
By Harold S. Hulbert, M. D.

California's Third Safety Meeting..... 95

Modernizing a Concrete Products Plant.....100-101

Departments

Chemists' Corner.....70-71
Hints and Helps for Superintendents.....72-73
Editorial Comment..... 74
Financial News and Comment.....76-78
Traffic and Transportation.....78-80
Foreign Abstracts and Patent Review.....82-83
Cement Products.....100-101
News of the Industries.....69, 74, 81, 102, 103
Rock Products Market.....104-107
New Machinery and Equipment.....108-110
Pertinent Paragraphs..... 111
News of All the Industry..... 112
Classified Directory of Advertisers.....122-128

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Crushed Stone Producer, Noted for Originality, Builds Sand Plant

John H. Odenbach, Dolomite Products Co., Rochester, N. Y., Builds a Plant Using an Overhead Traveling Crane to Do All the Handling of Finished Product, and a Pump to Bring Material from Pit to Plant

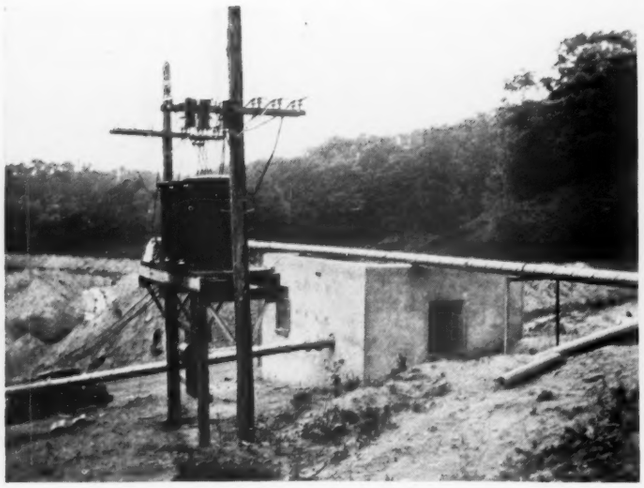
BY THOSE WHO KNOW him and his works it has come to be understood that he may be depended upon to do whatever new thing he tackles in a different and better way than it has been done before. So when we learned two or three months ago that he proposed to build a sand plant which would be different from other sand plants, the news aroused considerable interest, and now that we have seen this latest plant we feel that it is all of that, both different and better, and that we have not been disappointed in our expectations.

All of the above refers to John H. Odenbach, president, manager and engineer of the Dolomite Products Co., of Rochester, N. Y., whose Penfield and Gates stone-crushing plants with their new and unusual treatment of the problem have aroused considerable interest in the crushed-stone industry.

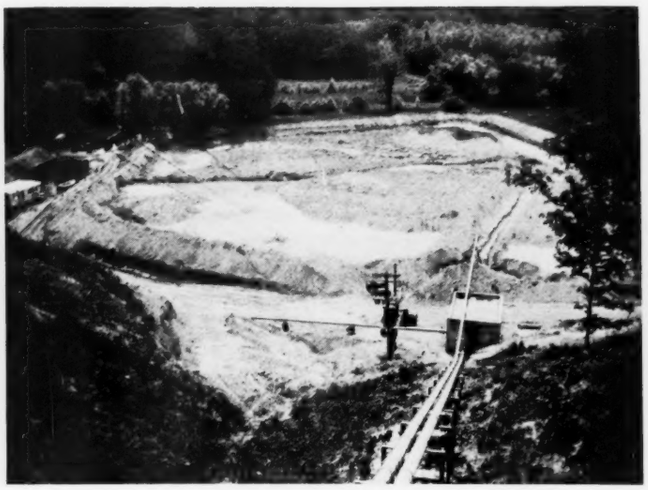
The new plant is unique and so far as we know is the only plant of its kind in the country using these particular handling methods in the production and loading of sand and gravel. It bears only a slight resemblance to the usual sand and gravel plant with loading bins or silos surmounted by screens.

The most striking departure from old ac-

Views from John Odenbach's sand plant at Rochester showing a striking departure from the accepted practice in the overhead traveling crane for handling finished product. Above is his dredge boat and to the left another view of the dredge showing pipe line and, in lower right-hand corner, the booster pump house

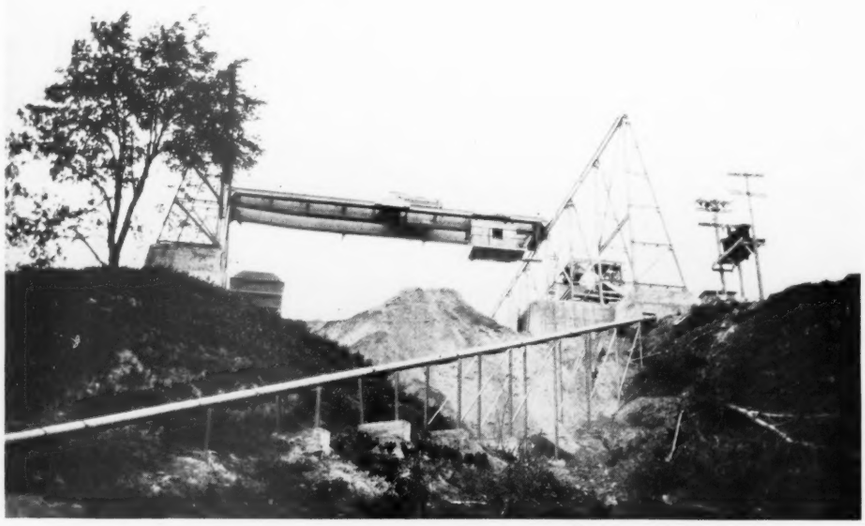


The booster house containing the 10-in. pump



Looking down on to the booster house and settling reservoir

cepted practice is the use of a large high-speed overhead traveling crane for handling the finished product from the screening plant to the loading bins, and to and from storage piles. The screening plant is interesting because of its simplicity, and also the pumping of the material to the plant through a booster pump. While not yet complete in all respects when this article was written, it was expected to have the plant in full operation very soon, and an output of 1200 tons per day was anticipated.

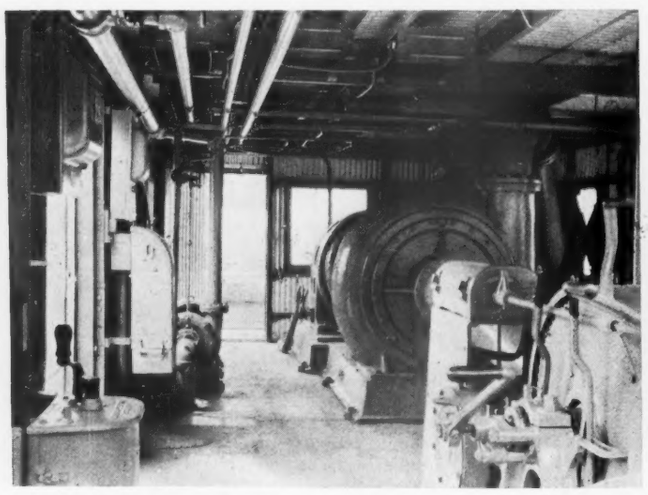


Storage yard, traveling crane and washing plant

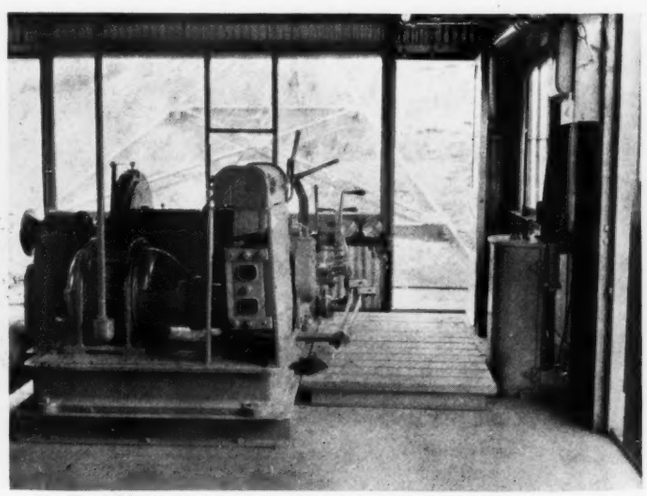
Briefly, the handling of the material is as follows: The sand and gravel are pumped from the deposit below the plant site by a suction dredge and through a second or booster pump to the screening plant located at one corner of the craneway and 138 ft. above the dredge.

Two vibrating screens, one crusher, and two sand-settling cones, with no elevators or conveyors, comprise the sizing plant, which is set just high enough above the ground level to let the various sizes spout to a number of concrete pockets just inside the crane runway space. From these the sized product is picked up by the clamshell bucket of the traveling crane and carried either to the truck-loading bins or to storage piles.

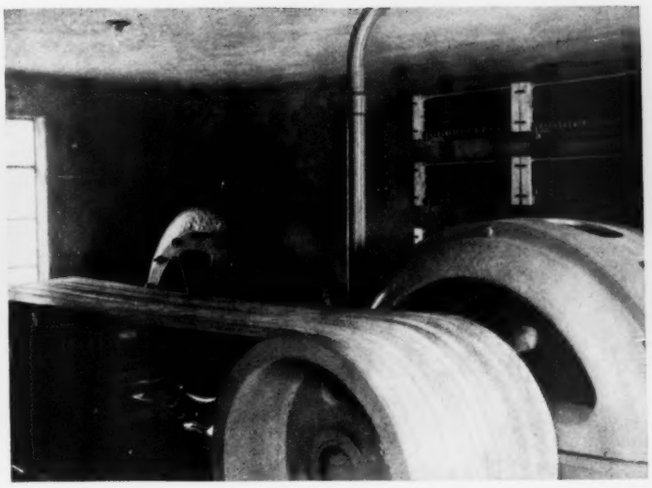
The crane covers an area 80 ft. wide by 280 ft. long, with the truck-loading bins located near the center of this space. All deliveries are by trucks, which are loaded from 10 steel hoppered bins in two parallel rows of five bins each, and from a three-compartment

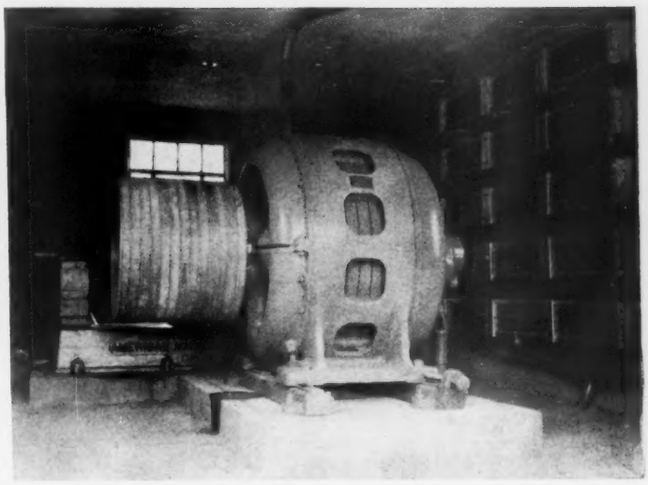


Rear end of the dredge boat, revealing pump and motor



Looking forward on the dredge with controls and hoist





The booster pump, showing also the motor and drive

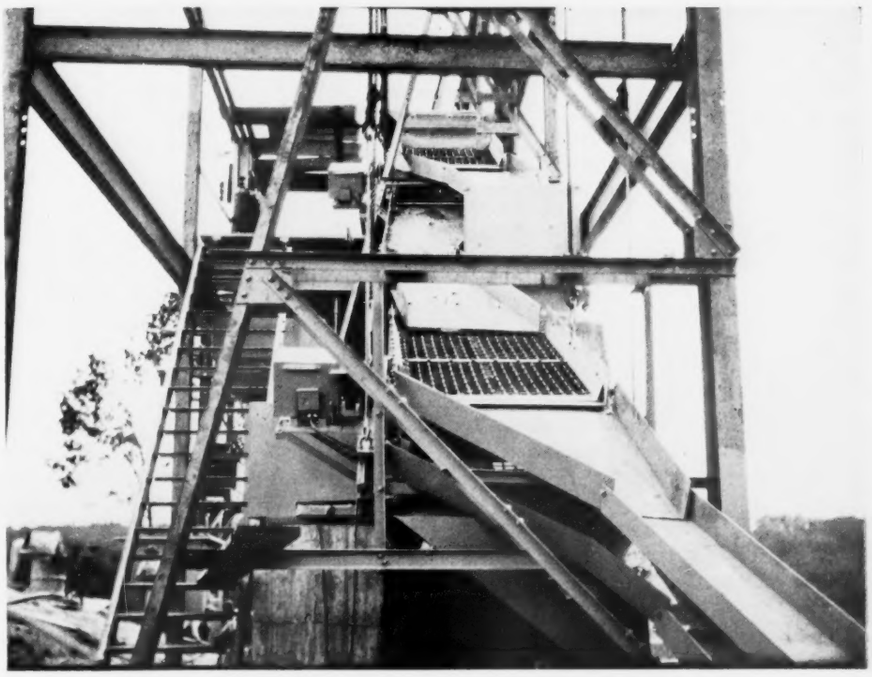
weighing batcher. These are of course kept filled by the crane.

The whole arrangement and layout is such that the operation may be handled with very few men and in an economical and flexible manner, the production being independent of the loading out, and the space served by the crane providing a large storage.

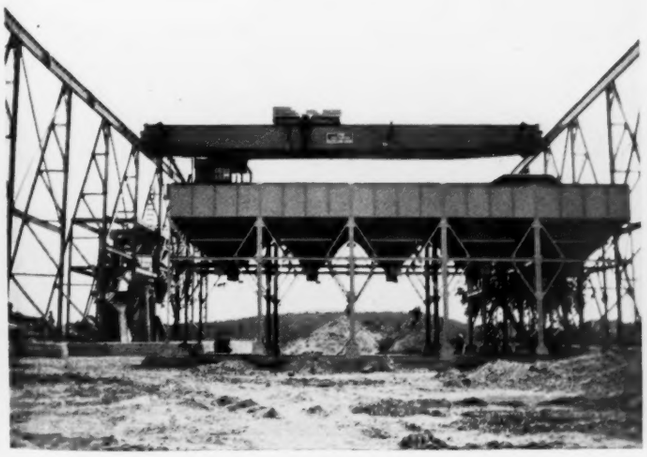
The plant is located on Dugway Road not very far from the Penfield plant of the company, and a few miles east of Rochester, and the storage and loading yard is at the level of the highway. Because of the rolling nature of the ground a space had to be leveled off for this part of the plant.

Dredging and Pumping

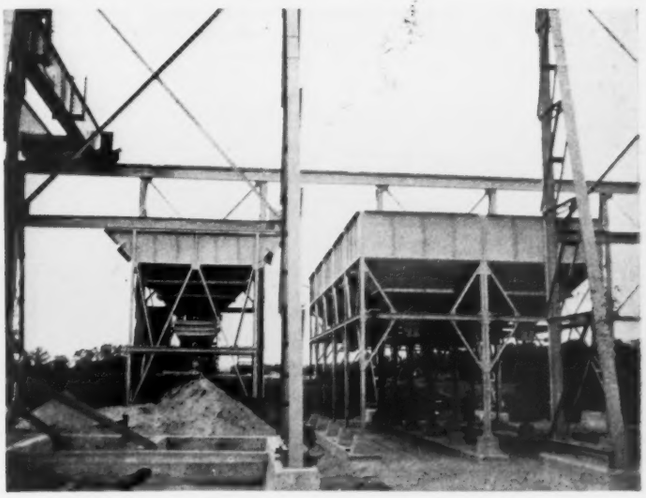
The dredge boat has a 20-ft. by 40-ft. by 3½-ft. steel electrically welded hull in two sections and six compartments, built by the Genesee Bridge Co. of Rochester, with a steel superstructure covered with Robertson protected metal. A 12-in. dredging pump made by the Erie Pump and Engine Works is used, connected through a flexible coupling with a 200-hp., 435-r.p.m.., General Electric slip-ring motor with a drum controller for



End view of the screens in the washing plant



Overhead traveling crane and truck loading bins. Washing and screening plant at left and batching bin at rear right



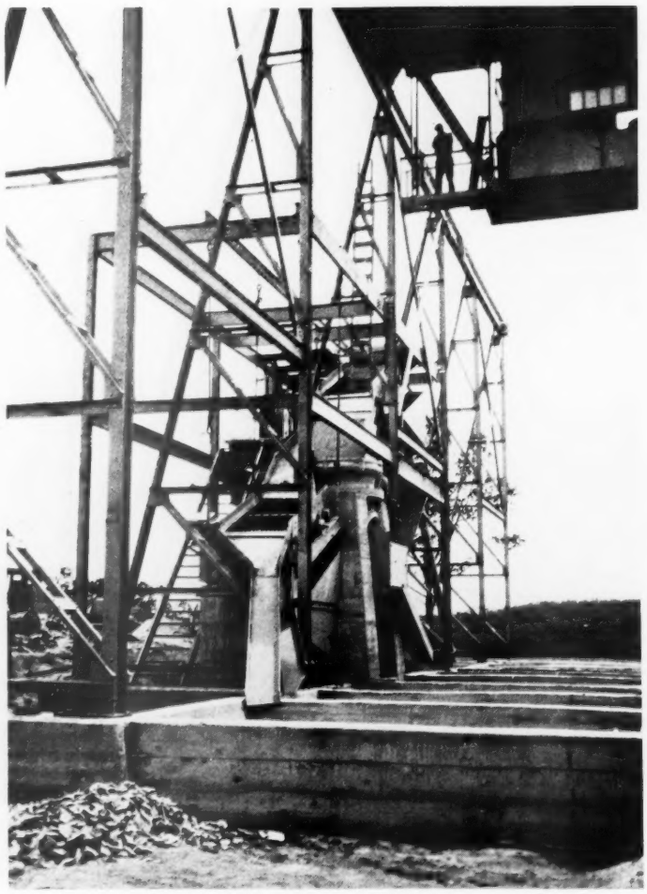
Another view of the truck loading bins beneath the crane and an end picture of the batching bins at the left

varying the speed if desired. The pipe size is reduced down to 10 in. as it leaves the dredge boat, the line from there on being of that size.

On the forward end of the boat a 3-drum hoist, made by the American Hoist and Derrick Co. and geared to a G.-E. slip-ring motor, provides for raising and lowering the suction line and for moving the boat, two drums being used for moving and one for hoisting. The controls for this and for the pump motor are within easy reach of the operator at the forward end.

A 4-in. centrifugal pump, made by the Morris Machine Works, and direct-connected to a Westinghouse induction motor, furnishes water for the priming of the dredge pump and for the washdown nozzle.

The booster pump about midway between the dredging operation and the screening plant is housed in a neat, substantial concrete building about 300 ft. from the dredge at its present location and about 30 ft. above it. The distance up the slope from the booster pump to the screening plant is another 300 ft., with an additional vertical lift of 108 ft.



Discharge end of the washing and screening plant with concrete pockets in foreground

A 10-in. "Amsco" pump made by the American Manganese Steel Co., is used at this point, driven through a Goodyear V-belt drive by a 200-hp., 505-r.p.m., Allis-Chalmers slip-ring motor, with Cutler-Hammer grids and controller for varying the speed. The use of the short center V-belt drive and sheaves also permits a further change of speed if desirable.

The 10-in. pipe for this dredging line as well as for the waste line back down from the screening plant is a spiral-welded, steel pipe, furnished by the Naylor Pipe Co., and is connected by flexible pipe couplings furnished by the Victualic Co.

Screening Plant

The 10-in. dredge line discharges to a steel sluice box from which the material flows on to a 4-ft. by 8-ft., double-deck Niagara vibrating screen with 2¾-in. mesh wire cloth on the upper deck and ⅞-in. mesh cloth on the lower deck.

The oversize passing over the top deck is spouted directly to a No. 5 Gates gyratory crusher, from which the crushed material is spouted into one of nine concrete pockets just inside the crane runway space.

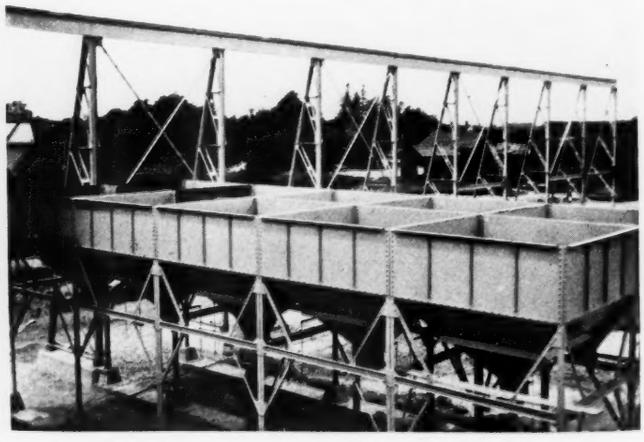
The gravel passing over the lower deck is spouted to a 4-ft. by 7-ft., triple-deck Niagara vibrating screen below for sizing, while the sand and water passing through the lower deck are split to two 8-ft. Link-Belt, sand-settling cones, the wash water flowing back down the hill in a 10-in. pipe to a large settling pond below. Two additional cones will be installed later to give greater capacity and regulation on the sand settling. At present the two cones now installed discharge the sand in spouts to the concrete pockets alongside, but later it is expected to install some sort of a conveyor arrangement to carry it over directly to the sand storage space.

The 4-ft. by 7-ft. triple-deck Niagara screen is equipped with a 2¼-in., 1¼-in. and ½-in. mesh wire cloth, and the four sizes produced are spouted directly to the concrete pockets.

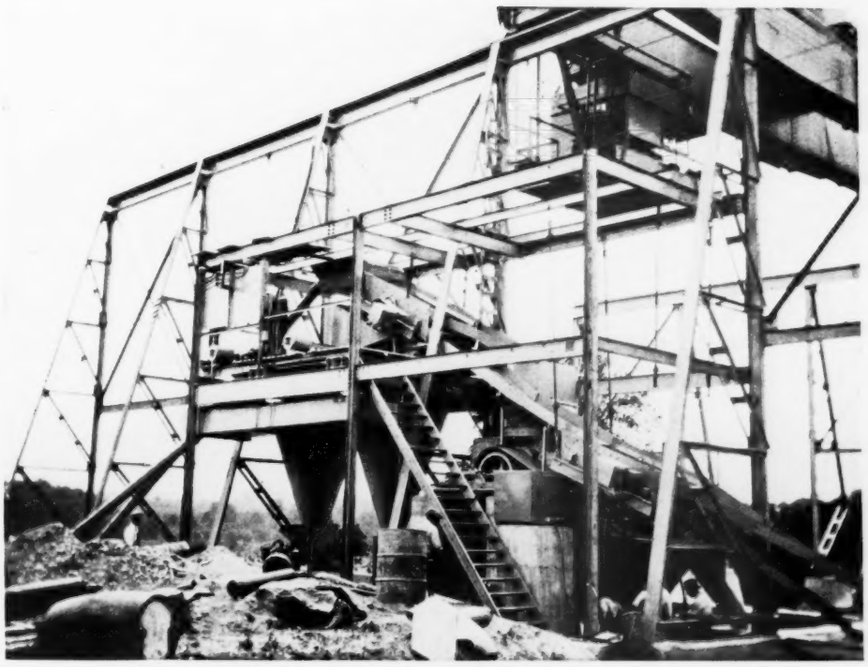
The Deposit

The deposit runs mostly to sand with not very much gravel and no very large pieces, so that there will not be a very large amount of crushed gravel to be handled from the concrete pocket, but it is intended to put this back into the hopper over the screens by means of the crane.

All the various sizes of gravel and sand will be handled from the concrete pockets



Looking down from the washing plant toward concrete pockets and truck loading bins. At the right is a snap taken from the same place over the top of the bins



Washing and screening plant, showing proximity to traveling crane

by the crane and clamshell bucket as necessary. That part of the storage space opposite the screening plant is being excavated about 10 ft. deeper than the rest of the storage space and will be covered with a concrete floor arranged to facilitate the drainage of the sand in storage.

The most noticeable thing about the screening plant is the simplicity of it. The material flows in a straight line over the two screens and into the pockets, and that's about all there is to it. The electrical controls are located in one place, from which the whole operation is visible, and the two screens and crusher are each driven by an individual motor on Texrope drive. The crusher rests on a concrete foundation and the screens are hung on manila rope from the steel frame above.

Overhead Traveling Crane and Storage

The crane, which was furnished by the Cleveland Crane and Engineering Co., is one of the latest high-speed types with a capacity to handle 140 tons per hour, and is equipped with a 2½-yd. Howard clamshell bucket. It operates on a steel runway having a clear span of 80 ft. and a length of 280 ft., with a height of 40 ft. from the foundations to the rails.

The ten 65-ton capacity steel truck-loading bins located near the middle of the storage space are arranged in two parallel rows so that trucks may be driven through from one side to the other. These bins were furnished by the Beaumont Manufacturing Co. of Philadelphia, Penn. For batching deliveries, a 150-ton, 3-compartment, weighing batcher, furnished by the Blaw-Knox Co., is located near the other bins.

Aside from the actual loading of trucks from the bins, all handling and storing of the product is done by one man in the crane, and the whole arrangement is so simple that it would indicate an unusually economical operation.

General

The power used in the plant is brought in on high-tension lines and transformed down to 3-phase, 60-cycle, 440-volts. Two sets of transformers are used, one set on the upper level for the screening plant and crane, and one set at the booster house below for the two pumps. Metering of the power is done on the high side.

Truck weighing is done over a 15-ton Buffalo platform scale installed at the plant office in front of the storage and loading yard.

For general utility purposes a Marion, Type 450, gasoline-electric, crawler-tread shovel is used around the plant, and a great deal of the construction work was done by it.

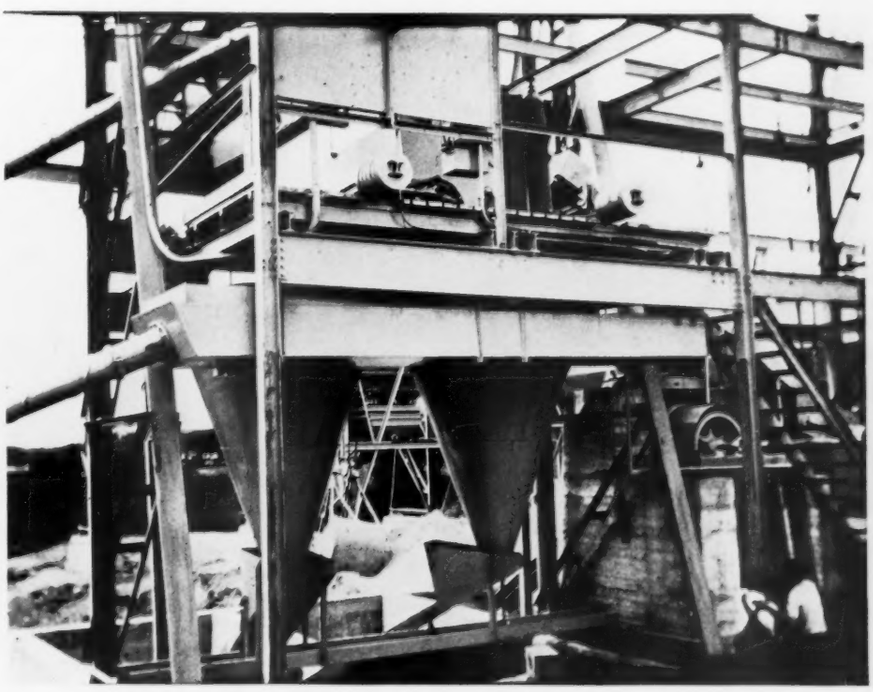
The steel work for the dredge boat as well as the steel runway for the crane and the frame of the screening plant was furnished by the Genesee Bridge Co.

South Dakota Mica Deposit To Be Developed

PLANS have been announced by Sigurd Olsen, president of the Black Hills Mica Co., and also head of the U. S. Mica Manufacturing Co. of Chicago, Ill., for development of the former company's mine five miles east of Custer, S. D.

Mr. Olsen announced at a meeting of the Custer Commercial club that operations would start at once for production of both sheet and scrap mica. A warehouse and buying station will be erected near the Burlington tracks here where others also may market either scrap or sheet mica, he said.

Mr. Olsen also made an appeal to the commercial club to co-operate with him and the local manager, Col. L. S. Powers, in securing a more reasonable freight rate on mica and feldspar. He declares that the rates on these products are entirely out of proportion with shipments from other parts of the United States. The Commercial club went on record as being willing to co-operate with the company and appointed a special committee to confer with its officers.—*Sioux City* (Ia.) *Tribune.*



This view of the sand cones shows overflow arrangement at left and dredge line discharge above

Gypsum and Gypsum Products Manufacture—Part IV

Regulation of Setting Time, Changes Caused by Hotpit Storage, Effects of Bin Storage, Devices for Preventing Kettle Leaks, Kettle Peculiarities

By S. G. McAnally

Chief Chemist, Giant Portland Cement Co., Egypt, Penn.; formerly Chemist for the Pacific Portland Cement Co., Mound House, Nev., and Chemist and Superintendent for the Standard Gypsum Co., Ludwig, Nev.

IN THE SEPTEMBER 13 issue of Rock Products we began the discussion of water ratio in connection with the properties of plasters and outlined some of the factors affecting water ratio. This article is a continuation of studies on boiling problems and advances some practical information gathered from the writer's experience in the calcination of gypsum.

Regulation of Setting Time

The setting time of the major portion of calcined gypsum finished products is regulated, at the mill, by the addition of retarders or of accelerators. Some products of single-boil and double-boil plaster, under various trade names, are shipped without any admixture. For those plasters which require regulation of the set, the amount of retarder or accelerator necessary will depend on the trade requirements, and on the setting time of the base product, single- or double-boil. The setting time of calcined gypsum, without admixtures, depends on the composition of the raw gypsum, the fineness of the latter, the temperature and length of calcination, hotpit storage, regrinding and aging, whether in storage bins, in air or artificially. The design of the kettle, and kettle defects, whether in the bottoms or in the gates, are factors that affect the setting time.

Generally, the higher the grade of the gypsum (not gypsite) the slower the plaster sets. With the exception of calcium carbonate, nearly all the impurities in gypsum accelerate the set. Anhydrite, a common impurity, accelerates the set and lowers the sand carrying capacity. The impurities vary in their efficiency as accelerators; i.e., a certain amount of one will have a greater effect on the set than would the same amount of another. A comparatively high-grade gypsum containing a small percentage of an alkaline salt would be quick setting.

Finely ground gypsum produces a slower setting plaster than does a coarsely ground gypsum; this applies to single- and double-boil calcination. The higher water ratio of the finer product may cause the variation.

Calcined gypsum attains its maximum setting time when calcined between 320 and 360 deg. F. Higher calcination temperatures produce quicker sets. The results of setting time tests on samples of plaster, taken at various temperatures from several calcinations, are shown in Table XI. The same consistency was used for each set of samples. The tests were made at two different gypsum mills.

The decrease in the setting time is more rapid during the second boil; above 370 deg. (end of boil) the decrease is gradual and not so pronounced.

Editor's Note

THE EFFECT of various factors on setting time of gypsum plasters is discussed, with particular reference to hotpit storage and bin storage. Kettle leaks are sources of much irregularity in the properties of gypsum plaster; the author's own devices for preventing such leaks are illustrated and described in detail.

Hotpit Storage Problems

Storage in the hotpit quickens the setting time of plasters calcined to between 340 and 380 deg. F. Material calcined to above 380 deg. F. is not much affected in this respect. The results of tests which follow also show that the setting time of double-boil plaster is affected more by hotpit storage than is single-boil; and storage of one hour or less does not seriously affect the setting time of either product.

	Calcination temperature	Time in hotpit—hours	Set—min.
TEST I			
	350 deg. F.	0	20
		½	20
		1	19
		2	15
TEST II			
	368 deg. F.	0	19
		½	18
		1	17
		2	12
TEST III			
(double-boil)	370 deg. F.	0	24
		½	22
		2½	14
TEST IV			
	390 deg. F.	0	12
		2	12

Except for plasters that have been calcined to under 320 deg., hotpit storage is to be avoided. The calcined material should be elevated to the regular storage bins as soon as possible. The plaster will cool considerably before it reaches the bins, and the tendency to age in the bins is lessened.

Changes Caused by Hotpit Storage

Hotpit storage is equivalent to longer calcination, i.e., calcination continues; and, de-

TABLE XI—EFFECT OF CALCINATION TEMPERATURE ON SETTING TIME

TEST I

Calcination, temperature	Setting time, min.
260 deg. F.	9
270 deg. F.	13
300 deg. F.	26
340 deg. F.	28
350 deg. F.	27
365 deg. F.	25
(start of) → 370 deg. F.	26
(½ hour) → 370 deg. F.	19
(1 hour at) → 370 deg. F.	16
380 deg. F.	15

TEST II

Calcination, temperature	Setting time (retarded) min.
300 deg. F.	80
325 deg. F.	88
350 deg. F.	84

TEST III

Calcination, temperature	Setting time, min.
290 deg. F.	32
310 deg. F.	50
330 deg. F.	51
345 deg. F.	48

TEST IV

Calcination, temperature	Setting time, min.
350 deg. F.	23
(start of) → 370 deg. F.	22
(20 min. at) → 370 deg. F.	20
375 deg. F.	14
385 deg. F.	13
390 deg. F.	12

TEST V

Calcination, temperature	Setting time, min.
340 deg. F.	23
373 deg. F.	12
393 deg. F.	13
410 deg. F.	12
415 deg. F.	11

pending on the calcining temperature and the length of storage, it produces changes in the plaster similar to those that result from higher calcination. These changes are: quicker setting time, lower plasticity and lower water ratio, greater density or weight per cubic foot. However, when single-boil plaster is held in the hotpit all the water liberated cannot escape freely, and some of it is held mechanically by the plaster; this is partial aging.

With double-boil material the residual water is insufficient to age the plaster, and the principal changes are an increase in density and lowering of the water ratio.

It requires from 30 to 45 minutes to empty the hotpit, and considerable steam is liberated during that period due to the continued calcination. Therefore, each hotpit should be provided with a steam pipe to carry off this steam and not permit it to condense on the walls and roof. Dust will adhere to the moist walls and form a coating of raw gypsum, which later falls into the hotpit and causes quick-setting plaster.

Some hotpits are provided with long pipes leading to the roof of the kettle building, but, on account of their length, they are not easily accessible for cleaning. Such steam or vent pipes become clogged in a short time. A type of steam pipe installed by the writer at one plant is shown in Fig. 1. It was made of galvanized sheet iron pipe 7 in. in diameter, and was connected to the lower part of the fog-stack. It could easily be dismantled, cleaned and quickly assembled.

It has already been stated that regrinding does not quicken the set of plaster; generally, it slows the setting time, but not to any appreciable extent.

Effects of Bin Storage

Storing plaster in bins has a similar action to storage in the hotpit, but due to the

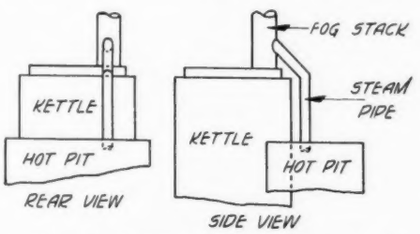


Fig. 1. Suggested arrangement of steam or vent pipe for hotpit

lower temperature of the plaster when it enters the bin, the deteriorating effect of bin storage is much slower in its action. The cooling effect, resulting from elevating the plaster from the hotpit to the storage bin, will depend on the plant design and on the temperature of calcination. Where an elevator and screw conveyors are used to convey the hot plaster, a drop in temperature of 140 deg. F. is not unusual. The men working on the packing machines often handle sacks of freshly calcined material, but the temperature seldom exceeds 250 deg.; otherwise, they would not be able to handle the plaster. A custom that is practiced in many mills and may be partly responsible for the aging of plaster in storage bins is the use of compressed air for making the plaster flow into the mixing hoppers; sometimes this air is very wet, and the moisture ages the plaster quickly.

Plasters that are aged due to storage in bins, to exposure to the atmosphere (in sacks) or that are aged artificially but without chemicals, are slower setting than the

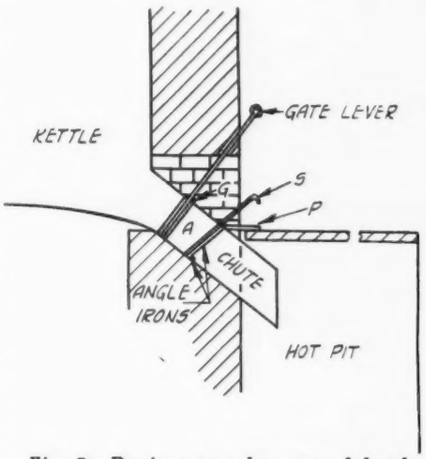


Fig. 2. Devices to take care of kettle gate defect and overcome leakage

fresh plaster, but the difference in the set is more noticeable when the comparison is made on the retarded plasters.

Kettle Peculiarities

Some calcining kettles are designed so that the flame and the hot gases pass from the firebox, through the port holes, to the front of the two lower flues. After passing through the latter the gases pass around the outside of the shell, along the wing-wall, to the front of the two upper flues, through the latter and thence to the smoke stack. Another design or setting permits the flame and hot gases to come in direct contact with the whole outer surface of the kettle shell; the gases pass directly from the lower to the upper flues and from the latter to the stack.

The last mentioned type of setting may have advantages in economy of fuel, but, in using it, there is a danger of over-calcining, even to the extent of producing some dead-burned gypsum, which acts as an accelerator for single- and double-boil plasters. During the settling periods, when the material has stopped boiling, the plaster is stagnant and the portion which is in direct contact with the hot shell becomes over-calcined.

One of the chief causes of quick-setting plaster, at the mill, is leaky kettle gates. Gates may leak at the bottom, due to failure or to inability to close them properly; they may, and generally do, leak at the sides; the steel plate, or slide, wears in the guides and leaves an excessive clearance which permits the raw or partially calcined gypsum to leak into the hotpit on top of the previously calcined batch. Even double gates will leak. Sometimes leaky gates are difficult to discover, and unless they are watched continuously for several hours a wrong conclusion may be arrived at. If quick sets cannot be attributed to any other cause, and devices, which will be described later, have not been installed to prevent leaks, close scrutiny of the kettle gates usually will be rewarded with seeing one or more of them leak.

Sometimes the gate will not leak while the kettle is being loaded (which deceives the observer), but as soon as the kettle charge swells and boils vigorously the leak starts. It may stop later as the material in the kettle gradually settles and changes in texture.

Nearly all kettle gates leak eventually, and if it has been observed that they leak a little at one time they will leak very much at another time. Holding plaster, containing raw or slightly dehydrated gypsum in the hotpit so as to calcine the latter, has never been successful. Indeed, it would be necessary to hold it so long a time that the plaster would lose much of its plasticity and sand carrying capacity, become "dead" and would be useless for hardwall plasters.

Devices for Preventing Kettle Leaks

Two devices, developed by the writer, to take care of the kettle gate defect, have been used successfully in several plants. One

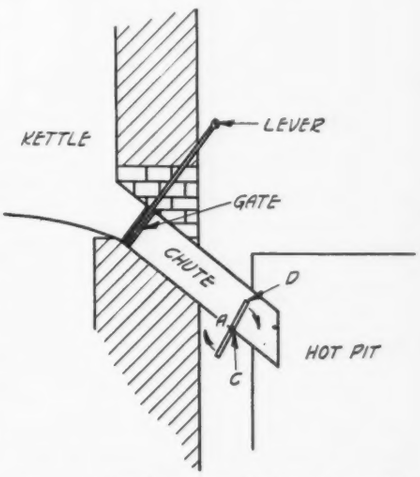


Fig. 3. Another gate device to prevent raw gypsum from entering the hotpit

was applied to kettles which are constructed so that the lower rear brickwork of the kettle serves as the back wall of the hotpit; i.e., there is no space between the kettle and the hotpit. Where there was a space between the two units a different device was used. One prevented the leak; the other prevented the raw gypsum from entering the hotpit.

A sketch of the former is shown in Fig. 2 and of the latter in Fig. 3.

In Fig. 2, *G* represents the kettle gate; *S* is a slide made of ⅛-in. sheet iron. The width of the slide should be equal to the width of the chute, and it should be sufficiently long so as to be withdrawn easily by the calciner. The slide rests against three

½-in. angle irons, which are riveted to the bottom and sides of the chute. After the kettle charge is dumped and the gate is closed, the slide is replaced and the space *A*, between the gate and the slide, is filled with calcined plaster, a supply of which may be stored in a convenient sized box on top of the hotpit. The plate *P* is attached to the top of the hotpit and extends to the slide. It helps to support the latter and also seals the hotpit at this point.

Fig. 3 shows the original design of the arrangement where the kettle and hotpit are separated. *A* is an opening cut in the chute. Its width is equal to that of the latter. The length may be from 4 to 6 in. *D* is a piece of heavy galvanized iron, rectangular in shape, and is attached to the chute at *C*; it is operated like the damper on a stove pipe. If the kettle gate leaks and the damper is in the open position (as shown in the sketch), the material will fall between the kettle and the hotpit. The upper half of *D* will prevent the escaping material from jumping the opening *A*. When *D* is rotated in the direction of the arrows it will seal the opening when it is desired to dump the kettle charge into the hotpit. This device can be and has been improved upon. The capacity of the hotpit should be large enough to allow all the material in the kettle to pass the chute and leave the latter clear.

When the kettle bottom leaks plaster into the fire-box, it is customary, in many gypsum plants, to empty a bucketful of pebble gypsum into the kettle at the beginning of the calcination so as to fill the cracks and stop the leak. The practice is more or less successful in its purpose and is not harmful to the plaster. The pebbles which do not lodge in the cracks remain at the bottom of the kettle even when the calcined charge is dumped into the hotpit.

In order to stop kettle bottom leaks at one plant, instead of using pebble gypsum, the coating or scale of raw gypsum, which adhered to the Raymond mill fan blades, was used. This coating is thin and laminated like slate, and is buoyant enough to float in the boiling plaster and be carried into the hotpit when the charge is dumped. These "slaty" pieces of gypsum are too large to be calcined in the usual period, and they will cause quick sets should they become disintegrated during the subsequent stages of operation.

The fog stack should be kept clean. If the draft is impeded due to the fog stack, becoming coated with mud and dust, calcination will be slow, due to the steam being unable to escape freely; the plasticity and the water ratio will be lowered. The steam will condense on the inside of the kettle cover and form a mud with the dust. This mud usually drops off when the kettle is dumped, due to the greater vibration of the mechanism when the kettle is empty or nearly empty and the plaster is quick setting.

(To be continued)

Extraction of Potash from Polyhalite

A RECENTLY PUBLISHED paper by H. H. Storch of the Nonmetallic Minerals Experiment Station, U. S. Bureau of Mines, New Brunswick, N. J., gives the result of study and experiment by that station over the past two years on the chemical and physical properties of polyhalite and discusses various processes for extraction of potash indicated by these investigations. Core drilling by the government in the Texas-New Mexico potash fields have revealed large deposits of polyhalite ($K_2SO_4 \cdot MgSO_4 \cdot 2CaSO_4 \cdot 2H_2O$), which should be of commercial importance in the production of potash fertilizers.

Three possible industrial processes, two producing K_2SO_4 and the third both K_2SO_4 and $K_2SO_4 \cdot MgSO_4$, are outlined, with estimated cost of production. Polyhalite as mined may contain as high as 10% of sodium chloride, but it was found that over 90% of the NaCl may be separated out by rapid washing with water at 20-25 deg. C. with a loss of only about 4% of the K_2SO_4. Hence it is considered feasible to remove the bulk of the NaCl in this way before calcining.

The three extraction processes are the same up to a certain point and include calcination after this first washing, followed by subsequent washings and treatments. Process No. 1 produces K_2SO_4 and $K_2SO_4 \cdot MgSO_4$, with a total potash recovery of 86.0%. A modification called Process No. 2 produces K_2SO_4 only, with a recovery of 79.8%, but this method is more complicated and difficult and includes the circulation of a large tonnage of schonite.

In Process No. 3, slaked-lime slurry is added to the calcined polyhalite extracts, resulting in the precipitation of the magnesium as $Mg(OH)_2$ along with gypsum. The chief difficulty encountered in this process is the formation of syngenite ($K_2SO_4 \cdot CaSO_4 \cdot H_2O$) along with the magnesia-gypsum precipitate, but when the solutions are properly adjusted, 93 to 98% of the magnesia can be removed, with 93 to 97% recovery of the K_2SO_4. The over-all potash recovery for Process No. 3 is 83.2%.

While this recovery is somewhat lower than for Process No. 1 and the indicated production cost is somewhat higher, still it is more efficient and simple from a chemical engineering standpoint, and there is also the possibility of marketing the magnesia-gypsum residue. This residue is perfectly white and after drying at 200 deg. C. and subsequent mixing with water, has good setting qualities, and might be used as a plaster. This latter process indicates a lime consumption for this purpose of about one ton per three tons of K_2SO_4.

The estimated cost of production is around $16 per ton of 90% K_2SO_4 and $8 per ton of $K_2SO_4 \cdot MgSO_4$, with freight charges to the eastern markets of about $8 per ton.

Great European Asbestos Cartel Formed

TURNER AND NEWALL, British asbestos producers, announce that, as a result of the amalgamation with the Bell group, they have been able to arrange with the principal manufacturers of 11 European countries an international cartel for asbestos-cement building products. The countries participating are Britain, Czechoslovakia, Belgium, France, Holland, Austria, Italy, Hungary, Spain, Switzerland and Germany.

Among the objects of this cartel are the exchange of technical knowledge, the establishment in Switzerland of an institute of research for the entire industry, the foundation of new factories in neutral countries, the organization of the export business, the standardization of quality and minimizing unnecessary variety in the product and mutual assistance in securing the material on the best terms.

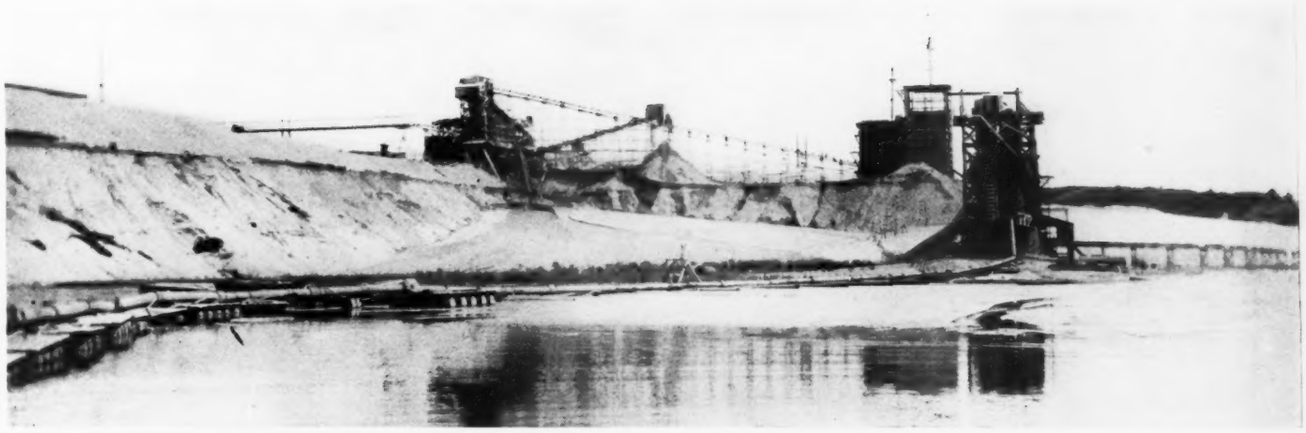
The amalgamation of Turner and Newall with the Rhodesian and General Asbestos Corp. will rationalize raw asbestos production in Africa in much the same degree as the firm has been able to rationalize the manufacture and distribution of manufactured asbestos, magnesia and allied products in Britain. On completion of this merger the company will become possessed of the major part of the superior grades of asbestos now produced in the world, and the quality of its reserves will be practically unlimited.

The firm's policy in the marketing of raw asbestos will be to seek to enter into frank and equitable arrangements for its supply to the principal manufacturers of the different countries of the world. The price policy in the distribution of raw asbestos will be to establish world prices on an economic level that will permit maximum development of the industry throughout the world and assure sufficient supplies as against the old state of affairs when manufacturers from time to time did not know when or where they might be able to get their raw material.

The company's capital has been increased from £2,232,848 ($11,164,240) to £3,096,505 ($15,482,525). This increase is mainly for stock issued for the various businesses which were added to the group. The capital is about to be increased again, bringing it up to £6,850,000 ($34,250,000), to provide for the acquisition of the Rhodesian corporation.

Gypsum in Nova Scotia

GYPSUM OUTPUT for Nova Scotia was 1,021,000 tons, three times that of all the rest of Canada during 1929.



Dewatering and washing plant of the McGrath Sand and Gravel Co., Chillicothe, Ill.

Status of the Sand and Gravel Industry in North-Central Illinois

Six Typical Plants Can Produce Some Two Million Tons Annually

By Earl C. Harsh
Associate Editor, Rock Products

PRACTICALLY ALL of the sand and gravel production of North-Central Illinois district comes from a half dozen plants in the vicinity of Peoria, three of which are located at Chillicothe, about 18 miles north of Peoria, two at Pekin about 10 miles south, one at Lincoln between Springfield and Bloomington, and a smaller operation at East Peoria.

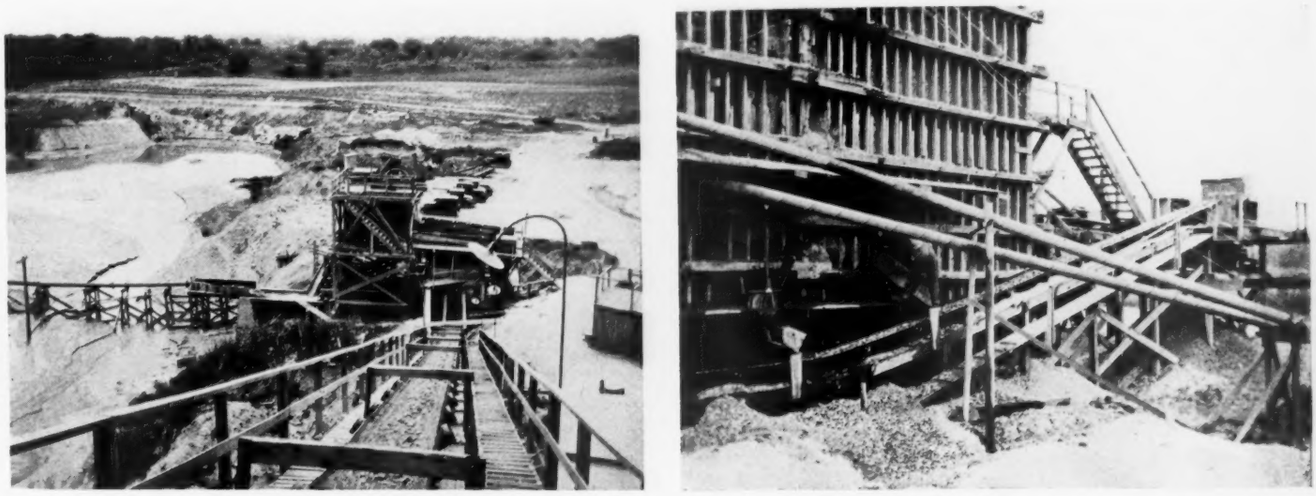
These plants with an aggregate capacity of some two million tons annually are all operating this season, though at somewhat reduced outputs because of general conditions. Four of the five plants at Chillicothe and Pekin are of the same general type, using a pump, dewatering elevator, and conical or cylindrical revolving screens, the other one using a cableway excavator from the pit to the plant.

Coogan Gravel Co., Chillicothe, Ill.

This plant, which is located on the Chicago, Rock Island and Pacific railway and has a present capacity of about 40 cars per 10-hour day, was started as a cableway excavator operation four years ago. It was operated in that way until two years ago when a dredge was installed. The material is now pumped to a sump and dewatering elevator, the oversize scalped out and crushed, and the minus 2-in. material carried on a belt conveyor to the washing and sizing screens above the bins.

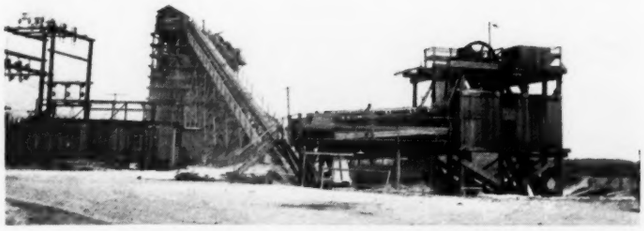
The pit is worked to a depth of about 50 ft., 25 ft. below the water line and 25 ft. above water. The deposit is covered with about 3 ft. of overburden which is washed down with the gravel. This was formerly stripped off with a shovel and trucks, but that method was found to be more expensive than sluicing down with the water jet on the dredge, as at present.

The dredge boat is built up on five steel cylinders and has a 12-in. Morris pump with direct-connected 350-hp., 2300-volt, General



At the Coogan Sand and Gravel Co. operation. Left, looking down main belt conveyor toward dewatering elevator and scalping screen. At right, mixing belt for railroad loading

Additional dry pit plant at Coogan operation for screening, recrushing and loading



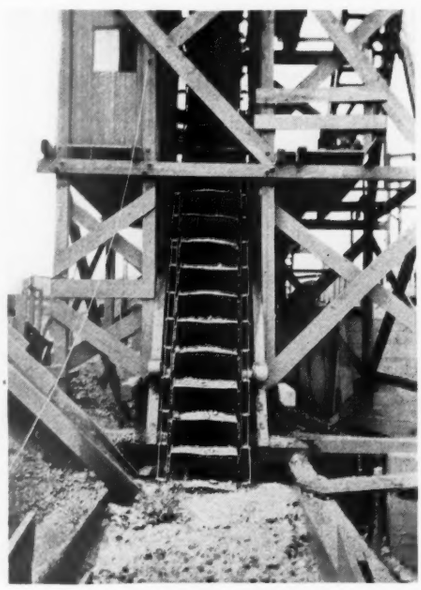
Washing plant and main belt conveyor with scalping screen in foreground at Coogan plant

Electric, slip-ring motor. There is a "Swintek" endless chain, screen nozzle ladder on the suction line. A washdown jet is used, which receives its water from a centrifugal pump with a 50-hp. motor, and a 10-hp. motor drives the priming pump. The "Swintek" endless chain screen and the hoist for the ladder and for moving are each powered with an individual 20-hp. motor.

From the dredge boat the material is carried in a 12-in. steel pipe line with rubber couplings on the pontoons and Dayton pipe couplings on the land line, to a concrete sump for dewatering. A Link-Belt dewatering elevator, with perforated buckets of 3 cu. ft. capacity traveling at a speed of 44 buckets per minute, carries the sand and gravel from the sump to a 48-in. cylindrical scalping screen with 2-in. round holes, from which the minus 2-in. material falls into a bin and the oversize is spouted to an 8-in. Telsmith crusher, where it is crushed down and returned to the screen. The elevator is driven by a 30-hp. motor, the screen by a 15-hp. motor, and the crusher by a 25-hp. motor with Texrope drive.

From the bin the material is fed to a 24-in. by 200-ft. inclined belt conveyor on which it is carried to the top of the washing plant. This conveyor is driven by a 40-hp. motor through a Jones reducer connected between the motor and the head shaft.

At this point the material is divided to two 48-in. by 24-ft. Telsmith cylindrical revolving screens of the new "Ajax" type, each driven by a 15-hp. motor through a silent-chain drive. Water is added to the material as it leaves the belt conveyor so that it is sluiced into the screens and is washed by jets of clean water throughout the length of the screens. Water for this purpose is furnished by two 6-in. centrifugal pumps, one a Thomas and one a Fairbanks-Morse, each driven by a 50-hp. motor.



Dewatering elevator at Coogan plant

The screens are jacketed and make five sizes of gravel and one size of sand.

From the screens the sized material falls into wooden bins below, from which it is drawn through spouts to railroad cars on one side, or to a mixing belt conveyor on the other. Normally six sizes are produced: sand or minus ¼-in.; ¼ in. by ½ in.; ½ in. by ¾ in.; ¾ in. by 1 in.; 1 in. by 1½ in.; and 1½ in. by 2 in. The mixing belt conveyor, which is 30 in. wide by about 110 ft. long, permits drawing from any of the bins to obtain mixed sizes, which are again washed over a perforated plate as they are spouted into the railroad car at the loading point.

With the exception of the main belt conveyor and the crusher, silent-chain drives are used throughout for driving all the equipment.

Adjoining this operation the company has a dry pit screening and loading plant of about 25-car per day capacity, with gasoline locomotive and dump cars. This plant was designed and furnished by the Smith Engineering Works, and includes a No. 40 Telsmith reduction crusher with a 48-in. revolving screen and 24-in. belt conveyors.

A Northwest, gasoline, crawler type crane with a 1-yd. clamshell bucket is used for stock piling, and a small Davenport steam locomotive for switching.

The offices of the company are in the Peoria Life Building, Peoria, Ill. P. M. Coogan is president; Miss DeEtta Clark, secretary and treasurer, and Porter Clark, superintendent.

Chillicothe, Ill., Plant of the McGrath Sand and Gravel Co.

This is the oldest and also the largest operation in the district. Started some 17 years ago, it was a cableway excavator op-

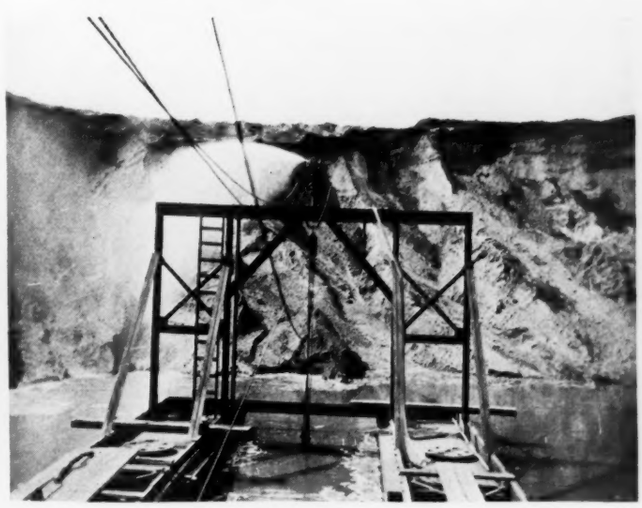
A general view of the Coogan plant at Chillicothe, Ill., and pontoon dredge with jet controlled from the operating room. Washing plant is in the background

Two views of loading silos at McGrath plant, Pekin. At the right, conical screen and flumes feeding sand-settling tanks

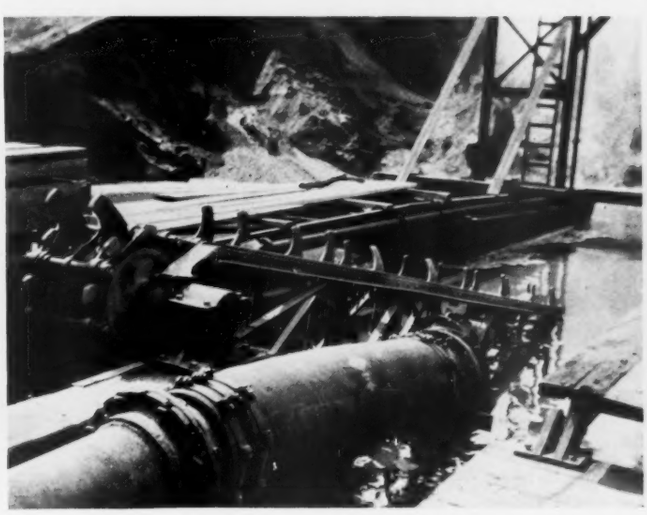
eration until about 4 years ago, when dredging was begun. A 10-in. pump was used for a while in the old pit and then a 15-in. pump was installed in the present pit. Plans are now under way whereby the dredging will be continued in a new pit location, and a new washing plant will be built adjoining the present old plant.

Three years ago a large storage system using belt conveyors and a tunnel was installed and has worked out very satisfactor-

At right, dewatering elevators and dredge seen from top of McGrath, Chilicothe, washing plant



Looking out forward on McGrath dredge at Chillicothe

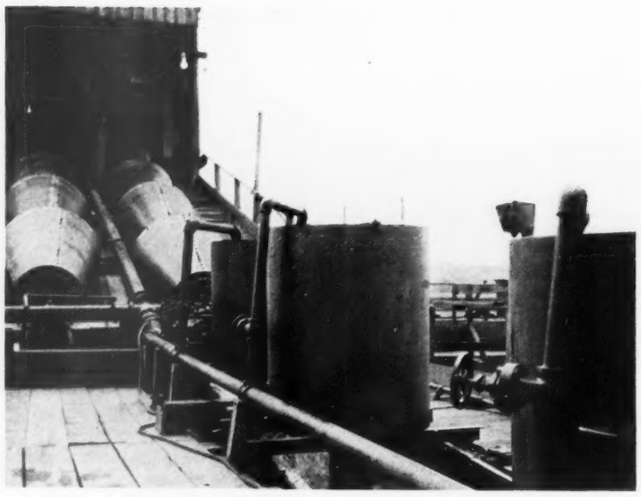


The cutter and suction line on McGrath dredge

ily. This was described in an article in Rock Products, June 25, 1927.

The plant is located on the Atchison, Topeka and Santa Fe railway and has a capacity of about 75 cars per 10-hour day.

Dredging is done with a 15-in. "Diamond" pump made by the Pettibone-Mulliken Co., and driven by a direct-connected, 400-hp., 500 r.p.m., 2300-volt Allis-Chalmers, slip-ring motor. This is mounted on a wooden hull dredge boat arranged with separate steel tank pontoons in front for handling the suction line.



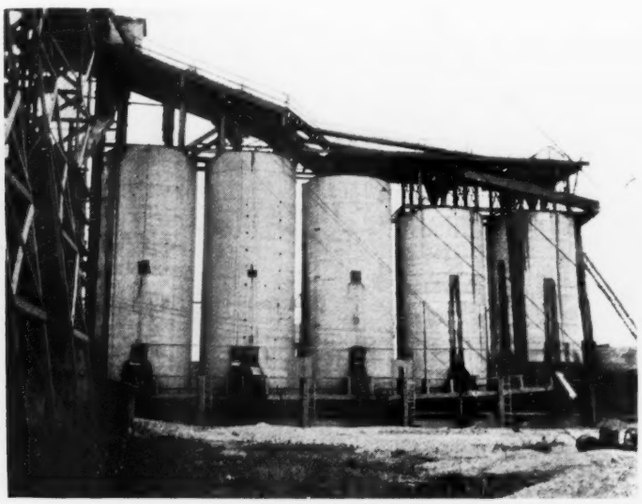
Top of McGrath washing plant at Chillicothe. Conical screens and sand classifiers can be seen

A structural steel ladder pivoted on the front end of the boat supports the suction line and serves as the track for a "Swintek" endless chain nozzle. This double strand chain with openings approximately 4 in. by 6 in. serves both as a cutter and a screen, the chain preventing any oversize material getting into the suction line, and the projecting arms carrying any oversize boulders clear of the suction head. It is driven at a slow speed (about 25 ft. per min.) through gearing at the upper end by a 20-hp. Allis-Chalmers motor. The ladder is raised and lowered, and the boat is also moved, by means of a Clyde drum hoist, gear driven by a 15-hp. Allis-Chalmers, slip-ring motor.

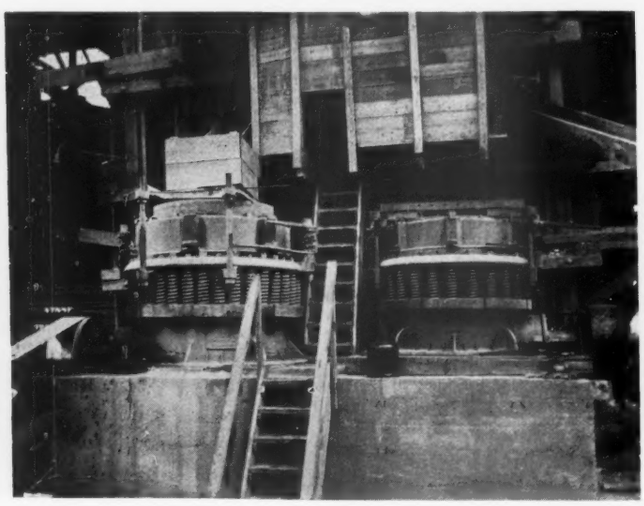
At the present time a depth of about 90 ft. of the gravel deposit is being taken out, 60 ft. above the water level and 30 ft. below. The deposit is covered with about 3 ft. of overburden, which is washed down with the gravel.

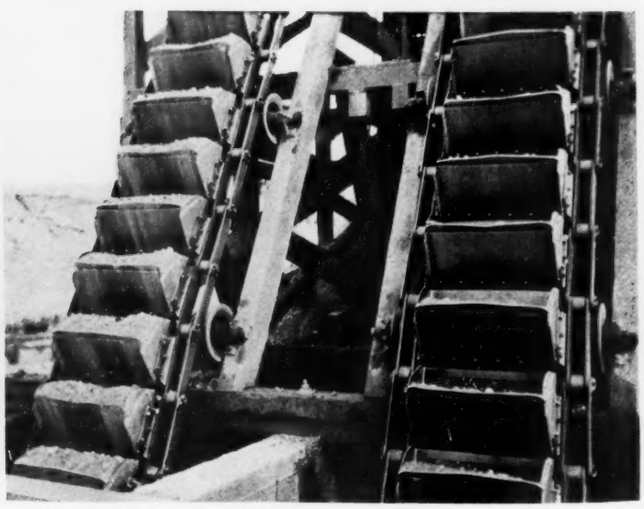
A washdown jet controlled from the operator's room is used to keep the bank broken down as uniformly as possible, and thus reduce the amount of caving, for caving, of course, disturbs the uniformity of the pumping. Water for this jet comes from a 5-in. Allis-Chalmers centrifugal pumping unit, with a capacity of 500 gal. per min., at 200 ft. head,

Looking from the top of the washing plant into the pit at the Pekin, Ill., plant of the McGrath Sand and Gravel Co.

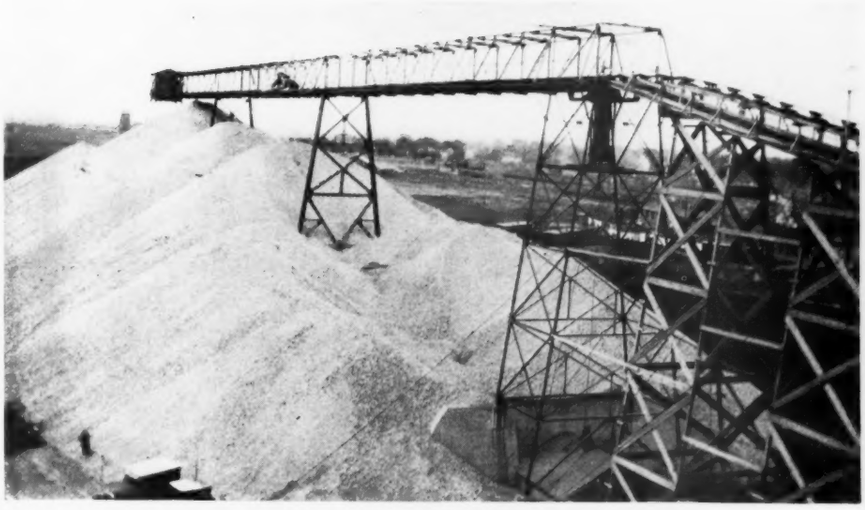


Rear view of McGrath silos at Pekin showing facilities for truck loading and for loading mixing belt to cars





The two cone crushers and the dewatering elevators at the McGrath plant, Chillicothe



Conveyor storage system at the McGrath plant, Chillicothe

and direct-connected to a 60-hp., 1800 r.p.m. motor, the line reducing to a nozzle about 1½ in. in diameter.

For priming the large pump and for keeping air out of the bearing and stuffing box, another centrifugal pumping unit is used. This is also an Allis-Chalmers unit, with a capacity of 175 gal. per min. at 90 ft. head and direct-connected to a 10-hp. motor. It is run continuously and its discharge put through an ejector or siphon, by which means the vacuum is obtained for priming and for entraining any air leakage.

The controls for these units are all located within reach of the operator on the forward upper deck, as well as a vacuum gage, pressure gage and ammeter, to show the conditions existing in the suction and discharge lines and also the load on the large pump motor.

The 15-in. pipe line from the dredge, with rubber sleeve couplings and Dayton pipe couplings, discharges to a double concrete sump where two Link-Belt dewatering elevators carry the sand and gravel up into a wooden loading bin from which it is fed to a belt conveyor. The elevators have perforated buckets of a capacity of 3 cu. ft. each which travel at a speed of about 44 buckets per minute. The overflow from the sumps goes back into the main pond. From this bin the material is fed to a 30-in. by 550-ft. inclined belt conveyor carrying over to the original belt loading point where the cableway excavator was used, where it is discharged to a second inclined belt conveyor carrying up to the washing plant over the railroad loading bins.

Here it is spouted to two parallel rows of five conical revolving screens in series, arranged with jets for washing, which separate the various gravel sizes to the bins. The sand through the lower screens is flumed to three Shaw classifiers (two 36-in. and one 30-in.), where it is sized and dewatered and delivered to the bins, the waste water going back to the pond.

Water for washing is obtained from wells dug in the gravel formation of the old washings and is delivered to the plant by two 8-in. American Well Works centrifugal pumps, each driven by a direct-connected, 75-hp. 1800 r.p.m motor.

Crushing of the oversize is done by two Symons cone crushers (one a 4-ft. and the other a 3-ft.).

Work is now under way on the new plant, which includes a wooden loading bin to feed a 36-in. inclined belt conveyor in a steel gallery. This conveyor will for the present spout to the present washing plant, but later to concrete silos which will be erected on the other side of the railroad loading track opposite the present washing plant and a new washing plant built over them. When the new conveyor unit is completed the dredge will be

New conveyor and loading bins being constructed for the future operation at the McGrath, Chillicothe, plant

Concrete loading silos and dragline mast at Contractors and Builders plant

worked around to a new location where it will pump to a new sump and dewatering elevator unit which will feed a 450-ft. belt conveyor carrying to the wooden loading bin previously noted. This new line-up will put the dredge into an even better deposit than it is now working in and will shorten the distance over which the material must be pumped and conveyed.

Plans for the new plant are being worked out by the Link-Belt Co., and the Mississippi Valley Structural Steel Co. is furnishing the steel for the conveyor gallery.

The offices of the McGrath Sand and Gravel Co. are at Lincoln, Ill. J. W. McGrath is president; T. E. McGrath, vice-president; T. P. McGrath, secretary. Fred J. Larcher is superintendent of the Chillicothe plant.

Chillicothe, Ill., Plant of the Contractors and Builders Supply Co.

This plant is similar to the other two at Chillicothe, except that a Sauerman slackline cableway excavator with a 1½-yd. bucket is used to excavate the material and carry it to a hopper above the washing screens. It is the newest plant in the district, having been built about three years ago, and has a capacity of about 20 cars per day. With the exception of the excavator it is Link-Belt equipped, and shipments are made by truck and the Rock Island railway.

The hoist for operating the cableway excavator bucket was built by Sauerman Bros., Inc., and its driving arrangements are different from many in that no gear shift is used, a 150-hp. two-speed Lincoln motor driving it, and giving a traveling speed of 1300 ft. per minute. The hopper into which the bucket empties is covered with a grizzly of railroad rails, and the material is sluiced into a single row of Link-Belt conical screens arranged with jets for

View from top of McGrath washing plant at Pekin. Note location alongside river, highway and railroad

Conical screens above silos at the Contractors and Builders Supply Co. plant, Chillicothe, Ill.

washing. Space has been left for the installation of a second row later. These screens have 1½-in., ¾-in., ½-in., and ¼-in. perforations to make the various gravel sizes, and a ⅞-in. size is also made over a small Link-Belt vibrating screen. The oversize is crushed in a 16-in. Rodgers jaw crusher located on top of the silos, and the sand is flumed to two wide Link-Belt sand drags which discharge torpedo and masons' sand to the silos. A perforated plate screen in this flume makes the separation of the torpedo and masons' sand. Any excess sand over the loading requirements is flumed direct to a storage pile.

Water for washing is furnished by an 8-in. Allis-Chalmers centrifugal pump of a capacity of 1200 gal. per min., direct-connected to a 100-hp. motor. This water is taken from an old pit, and the wash water returned to another adjacent pit.

Six concrete silos 18 ft. in diameter and ranging from 45 ft. to 28 ft. in height serve for storage and loading. Railway cars are switched by a Vulcan steam locomotive, and a Type 450 Marion electric crane with a 40-ft. boom and 1¼-yd. clamshell bucket is used for stock piling and general utility.

The company has offices in Peoria and W. C. Gill is general manager. F. C. Anderson is plant superintendent.

East Peoria Sand and Gravel Co., East Peoria, Ill.

This is a small cableway excavator operation reclaiming sand and gravel from the creek bed alongside and with a capacity of from 200 to 225 tons per day, which is loaded out in trucks.

The material is dragged to a hopper at ground level from which it is fed to a bucket elevator and washed and screened over the bins. Any surplus over the loading requirements is piled by means of a car on an inclined track from the bins.

The supply of material is washed down each season by high water and excavated from a point opposite the hopper, and when this has been periodically depleted is obtained from points further up the stream and carried down to the hopper by means of a dump truck equipped with flanged wheels running on a track along the bank.

John Gibbons is general manager.

Pekin, Ill., Plant of the McGrath Sand and Gravel Co.

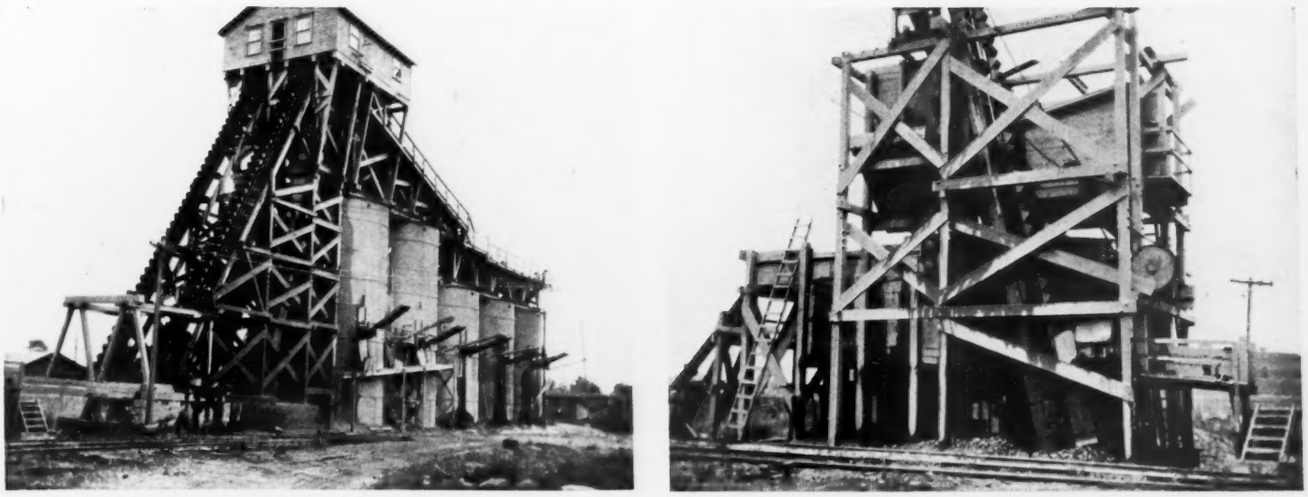
This plant with a capacity of 50 cars per 10-hour day is located along the Illinois river and on the main highway just north of Pekin.

Dredging is done with a 10-in. "Diamond" pump built by the Pettibone-Mulliken Co., and driven by a 400-hp. General Electric motor. This pumps to a concrete dewatering sump where a Link-Belt dewatering elevator carries the sand and gravel up to a bin from which it is fed on to a 30-in. by 500-ft. inclined belt conveyor leading up to the washing plant. This conveyor is driven by a 60-hp. G. E. motor through a silent-chain drive, and discharges the material to two parallel rows of four conical screens in series, with jets for washing, and with 1¾-in., 1-in., ⅝-in. and ¼-in. perforations.

The sand through the lower screens is flumed in two parallel flumeways to six sand-settling cones. Screens in these flumes make the separation between torpedo and masons' sand, four cones handling the torpedo or coarse sand and two cones the finer mason's sand. Four gravel sizes are normally produced.

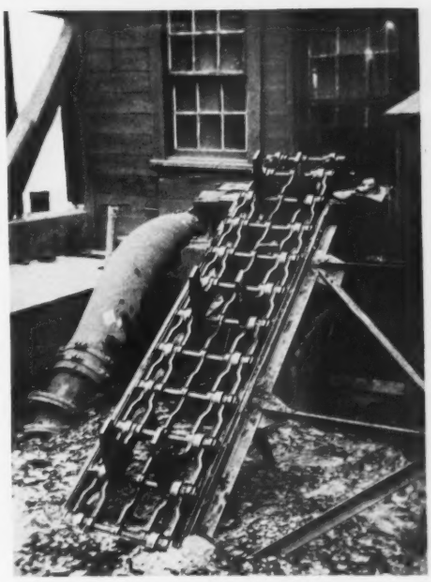
The oversize material is spouted to a large wooden bin near the silos and is crushed as necessary by a No. 5 Austin

Dredge discharge and dewatering elevator at the McGrath operation at Pekin



The Springfield-Pekin Sand and Gravel operation, showing a general view and at right the scalping and crushing plant

Closeup of conical screens and sand flumes at Springfield-Pekin plant



The cutter and suction line of the dredge at Springfield-Pekin plant

gyratory crusher and returned on a belt conveyor to the main 30-in. belt serving the washing plant.

Water for washing is supplied by an 8-in. centrifugal pump with a capacity of 2000 gal. per min., direct connected to a 75-hp. motor.

Practically all of the drives are with Link-Belt silent-chain, from General Electric motors. The deposit, which is overlaid with about 3 ft. of overburden, is worked to a depth of 50 ft. ,about 25 ft. above water and 25 ft. below.

Five concrete silos 20 ft. in diameter and ranging from 45 ft. to 35 ft. in height are used for truck and rail loading, three (with a partition through one) being used for gravel and two for sand.

Railroad cars are loaded direct through spouts on one side, while the other side is arranged for truck loading and for mixing different sizes on a 24-in. by 250-ft. belt conveyor extending to a railroad loading dock beyond the silos. The truck runway is on a lower level than the tracks and the gates on this side permit of drawing the full depth of the silos.

Gravity tracks are used with a three-track storage above the plant and two tracks below. For stock piling and for any switching necessary a McMyler-Interstate locomotive crane is used.

The present plant was built in 1926 to replace the old plant, a short distance north, and is now in its second season of operation. It is also Link-Belt equipped.

R. H. Ashley is plant superintendent.

Pekin, Ill., Plant of the Springfield-Pekin Sand and Gravel Co.

This plant, with a capacity of about 50 cars per 10-hour day, is similar to the McGrath plant at Pekin, except that no belt conveyors are used and the silos are steel instead of concrete. Built about six years ago, it is also a Link-Belt equipped plant and is located just south of Pekin on the Chicago and Northwestern railway. Gravity tracks are used with loading facilities on both sides of the silos.

The dredge boat, which has been in service about six years in the present pond, is equipped with a 12-in. "Amsco" pump built by the American Manganese Steel Co., and driven through a flexible coupling by a 400-hp., 2200-volt, 430-r.p.m. Allis-Chalmers, slip-ring mo-

Springfield-Pekin Sand and Gravel Co. dredge

Springfield-Pekin gravel deposit, washing plant in the background. At right, the silos and elevators with scalping screen and recrusher

tor. Excavating is done to a depth of about 30 ft. below water. The dredge is equipped with a 55-ft. ladder and a "Diamond" chain cutter furnished by W. H. K. Bennett Co., and manufactured by the Pettibone-Mulliken Co. This chain, which is made of manganese steel, travels at a speed of 28 ft. per min. and carries any oversize material away from the suction inlet. It is driven through gearing by a 20-hp. Allis-Chalmers motor.

A five-drum Clyde Iron Works hoist, driven by a 15-hp. Allis-Chalmers, slip-ring motor, is used for raising and lowering the ladder and for moving the boat, one drum being used for the ladder and the other four drums for the shore lines by which the boat is moved and held in position. The 12-in. pipe line from the dredge is connected by rubber hose couplings on the pontoons and by Dayton pipe couplings on the land lines.

An additional 10-in. dredge boat in another pond is kept for emergency.

The pump discharge from the dredge is to a revolving screen with 1¾-in. perforations where the minus 1¾-in. material is flumed to a concrete sump and the oversize elevated and crushed in a No. 5 Austin gyratory crusher which discharges to the flume and sump.

Pontoons are used for dumping stripping back into the lake at the Lincoln Sand and Gravel operation

From the sump the material is carried up to the washing plant in two parallel Link-Belt elevators with buckets of 3 cu. ft. capacity and discharged to two parallel rows of three conical screens in series. These screens have 1¼-in., ⅝-in., and ¼-in. perforations, which separate out three gravel sizes and pass the sand on in flumes to six sand-settling cones, where two kinds of sand, torpedo and masons', are spouted into the silos.

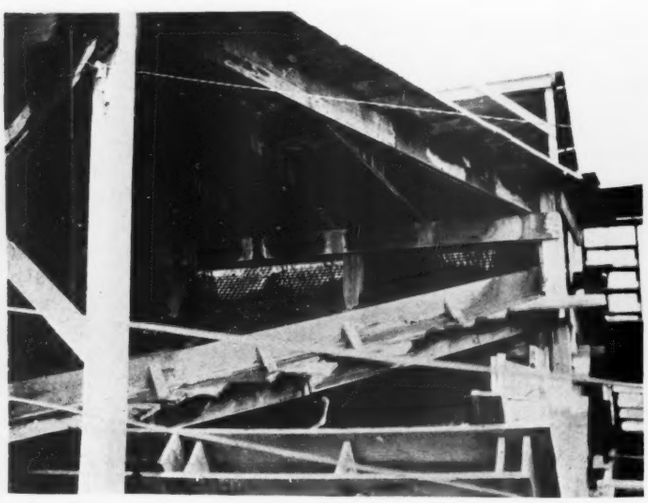
Five silos are used, three for gravel sizes and two for sand sizes. They are of steel plate construction, bolted, 25 ft. in diameter, and 35 ft. and 45 ft. in height.

Water for washing is supplied by an 8-in. centrifugal pump furnished by the Dayton Dowd Co., and direct connected to a 100-hp. Northwestern, slip-ring motor.

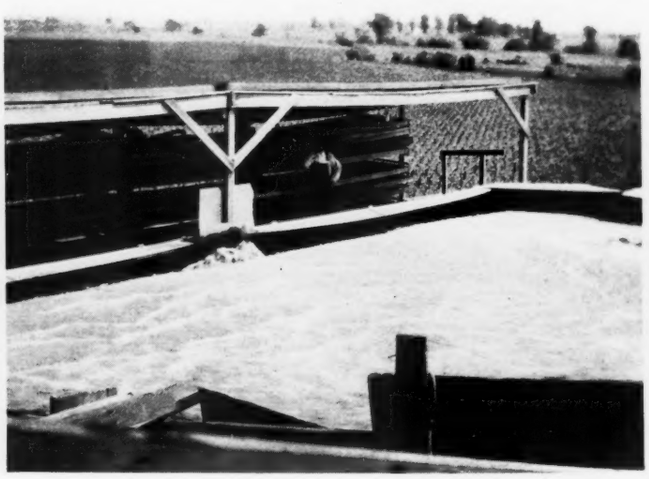
The Springfield-Pekin Sand and Gravel Co. has offices in Springfield, Ill. M. D. Schaff is president, and C. L. Preston, superintendent.

Lincoln Sand and Gravel Co.

This company has a quite simplified and



View under the main discharge deck showing stationary screens at Lincoln Sand and Gravel plant



The main discharge from the dredge line at the Lincoln plant. Racks of spare screen frames can be seen

A worked-out deposit which is being developed into recreational spot for bathing and boating at the Lincoln, Ill., plant of the Lincoln Sand and Gravel Co., and a dredge used by the same company

inexpensive plant and one which produces the desired materials with very little mechanical equipment. No vibrating screens are used, nor are any rotary screens used, except two small conical screens for re-screening the oversize. All of the separating is done on gravity screens using the force of the water from the dredge line along with some added clear water.

Dredging is done with a simple dredge boat equipped with a 10-in. pump and 300-hp. motor without the use of a cutter of any kind on the suction and without a jet, as the deposit does not seem to require either.

The dredge discharge is pumped to a rather flat deck covered with steel plates where the material is spread out thinly and sluiced to the screens. This deck tapers out to a width about equal to the length of a railroad car at the end where it discharges to the stationary screens, so that the pump discharge is quite evenly distributed over the whole surface.

The material flows on to two screens in long, narrow sections just beyond this deck and inclined so that they are approximately at right angles to the flow of material, the first screen removing any oversize and the second retaining all material larger than coarse sand size. That going through the second screen flows over on another rather flat wide deck to the coarse and fine sand hoppers, the very fine material and dirty water overflowing back into the lake.

The material passing the first screen and retained on the second falls into the first loading hopper. It contains all sizes suitable for concrete aggregates and is marketed as such under the name "Con-mix." It is of course easily varied by the use of different screen sections which are easily and quickly put into place. More of the finer material is added as desired by the simple expedient of hanging small triangular steel plates over the second screen.

There are three shallow loading hoppers with hoppered bottoms for "Con-mix," coarse sand and fine sand, each about the length of a railroad car and over parallel adjoining tracks. Loading is by means of a number of slide gates under each hopper, all controlled by levers from a loading platform on one side. No dewatering is done before loading, the cars draining after being loaded.

Quite a variety of sands and of sand and gravel mixes are made by simple control of the water in the case of the fine sizes, and by a change of screen sections, frames of various meshes being kept ready in a convenient rack.

This plant is rather unusual in the simplicity of its arrangements. No re-crushing is done, since the amount of oversize in the deposit is quite small. Switching of railroad cars is done by the company's own steam locomotives.

The stripping operation as carried on at the present time is unusual and interesting in that it is being dumped back into the lake and that pontoons are used to support the end of the dump track. As indicated in the accompanying picture, four pontoons are used, in pairs with a space between, into which the material is dumped. When the fill thus made is sufficient to support the track, the pontoons are moved out and dumping continued as before. Small side dump cars are used, with Plymouth gasoline locomotives, and in connection with a steam dragline outfit.

Of interest also is the way in which the worked-out part of the deposit is being utilized as a bathing beach, and the lake for boating. A bathhouse and boat house have been provided and it is planned to erect other buildings so that it will later have all the facilities for recreation and amusement of any resort. Adjacent to the main highway south of Lincoln, it is well located for such a purpose. As good bathing and boating places of this kind are not any too plentiful, this should eventually be a profitable side line to the sand and gravel business.

V. O. Johnston is president and treasurer, and E. G. Johnston, secretary.

Car-loading arrangements at the Lincoln Sand and Gravel Co., Lincoln, Ill.

New Rotary Kiln Installed in Brazil

THE Cia. Brasileira de Cimento Portland S/A, Canadian owned, has installed a new rotary kiln which will bring its annual capacity up to about 1,000,000 bbl. However, the new kiln is not yet being operated on account of business conditions. The Canadian company has also established a branch at Cabo Frio on the coast of Rio de Janeiro, in order to take advantage of cheap water transportation.—(C. R. Cameron, U. S. Consul General, Sao Paulo.)

Has Geological Museum

THE STATE DIVISION of Mines maintains a museum housing an exceptionally fine collection of rocks and minerals of both economic and academic value in the Ferry building, San Francisco, Calif.

Researches on the Rotary Kiln in Cement Manufacture†

Part V—The Size of the Clinkering Zones of Rotary Cement Kilns Necessary for a Given Output Calculated from Thermodynamic Data —Temperature Required for Making Clinker

By Geoffrey Martin

D.Sc. (London and Bristol), Ph.D., F.I.C., F.C.S., M. Inst. Chem. Eng., M. Inst. Struct. Eng., M. Soc. Pub. Analysts, F. Inst. Fuels; Chemical Engineer and Consultant; Former Director of Research of the British Portland Cement Research Association; Author of "Chemical Engineering"

(1) IN ORDER to make portland cement clinker, the raw materials in the final stage must be heated to about 1371 deg. C. (2500 deg. F.) so as to reduce the constituents to a mass not wholly fused nor wholly solid. If heated too highly, it is commonly stated that clinker becomes inert and unsuitable for making cement. If not heated highly enough, an unsound clinker is produced, which expands on cooling and falls to dust.

(2) In order to attain this clinkering temperature of the material, the brick walls of the kiln must be heated to a temperature considerably higher than this, yet not so high as to cause the brickwork to fuse.

(3) Also it is assumed that the whole of the heat necessary to make the clinker passes through the clinkering zone.

(4) Then the area of surface of the clinkering zone must be such that in a given time it must radiate away absolutely as much heat as passes through the clinkering zone per unit time. From this fact we can calculate the surface required to produce a given amount of clinker.

Calculation of the Heating Surface Required in the Clinkering Zone

Let y lb. of clinker be made by the combustion of 1 lb. of coal of 12,600 B.t.u. per lb.

M tons per hour of clinker be made = 2240 M lb. per hour.

In order to make this weight of clinker, the weight of coal required $\frac{2240\,M}{y}$ lb. per hour, and the B.t.u.'s are evolved from the coal at the rate of

$$\frac{2240\,M}{y} \times 12{,}600 = \frac{M}{y} \times 28.23 \times 10^6 \text{ B.t.u. per hour} \quad \text{.....(1)}$$

In the ordinary construction of the kiln this heat is liberated in the clinkering zone at the high temperature of over 1371 deg. C. (2500 deg. F.). The surface exposed by the clinkering zone must be such that when heated to this temperature it will radiate away per hour as much heat as it receives. The reason of this is that the coal in burning in the clinkering zone can generate a much higher temperature than 1371 deg. C., and therefore, if there is not sufficient radiating surface exposed by the clinkering zone, the temperature of the surface or the clinkering zone will steadily increase (and thereby its rate of radiation steadily increase) until it radiates away per hour as much heat as it receives.

Now if the clinkering surface be made so large that when it attains the clinkering temperature of 1371 deg. C. (2500 deg. F.) it radiates away as much heat in a given time as the coal imparts to it, it obviously cannot be heated beyond this temperature by the amount of coal burnt in the kiln, and consequently overheating is impossible, because if the temperature of the brick surface rises beyond 1371 deg. C. it will radiate away *more* heat than it receives from the coal.

Hence the area of the necessary surface of the clinkering zone can be calculated on the assumption that when heated to the clinkering temperature of 1371 deg. C. (2500 deg. F.) it will radiate away as much heat as the coal burnt within it can generate in the same time.

Hence we have to calculate the surface S sq. ft. of the clinkering zone, which, when heated to 1371 deg. C. (2500 deg. F.), will radiate away per hour

$$28.23 \times 10^6 \times \frac{x}{y} \text{ B.t.u.}$$

where M = number of tons of clinker made per hour.

y = number of lb. of clinker made by the combustion of 1 lb. of coal of 12,600 B.t.u. per lb.

By Steffan's law of radiation:

$$Q = E\sigma T^4 \quad \text{.....(2)}$$

where Q = number of gram-calories radiated per second per square centimeter of radiating surface.

E = the emissivity of the brick.

σ = the emissivity of a "black body" radiation.

T = the absolute temperature in centigrade degrees.

According to A. T. Green‡:

For brick $E = 0.72$.

$\sigma = 1.279 \times 10^{-12}$ gram-cals./sec./sq. cm.

Also T = 1371 deg. C. = 1371 deg. + 273 deg. absolute = 1644 deg. absolute C.

So that $Q = 0.72 \times 1.279 \times 10^{-12} \times (1644)^4$

$= 6.728$ gram-cals./1 sec./1 sq. cm.

Now, converting these into the British system of units§:

1 sq. ft. = 0.929×10^3 sq. cm.

1 hour = 3.6×10^3 sec.

1 B.t.u. = 252 gram-cals.

Converting

$$Q = \frac{6.728}{2.52 \times 10^2} \times (3.600 \times 10^3) \times (0.929 \times 10^3)$$

$$Q = 8.93 \times 10^4 \text{ B.t.u.'s/1 hour/sq. ft.}$$

Hence the radiation from S sq. ft. is

$$Q = 8.93 \times 10^4 \times S \cdot \text{B.t.u.'s per hour} \quad \text{.....(3)}$$

Editor's Note

SOME MATHEMATICS in this article, which, however, can be readily followed through; formulas are developed, based on the laws of thermodynamics, for calculating the heating surface required in the clinkering zone, and the length of the clinkering zone for a given diameter of kiln and clinker output. This formula and the accompanying table showing the relation between output, diameter and length of clinker zones are here given for the first time.

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*Tons in every instance are British tons of 2240 lb. To convert to tons of 2000 lb. multiply by 1.12.

‡"The Thermal Properties of Refractory Materials," *Trans. Eng. Ceramic Soc.*, 1925-26, vol. xxv., p. 383.

§In British units:

H = B.t.u.'s/hour/square feet = $0.72 \times 0.162 \times 10^{-8} \times 2960^4$.

Equating this against the heat evolved from the burning coal, we have

$$\frac{M}{y} \times 28.23 \times 10^6 = 8.94 \times 10^4 \times S,$$

$$\text{or} \quad M = \frac{8.93}{28.23} \times \frac{10^4}{10^6} \times yS$$

$$M = 0.3167 \times 10^{-2}\, yS \quad \text{.....(4)}$$

$$\text{or} \quad S = 315.7 \frac{M}{y} \quad \text{.....(5)}$$

In words:

In order to make M tons of clinker per hour, and assuming all the coal is burnt in the clinkering zone, and that the efficiency of the kiln is such that it makes y lb. of clinker for 1 lb. of standard coal burnt therein of 12,500 B.t.u. per lb., then the surface necessary for the clinkering zone is given by the formula

$$S = 315.7 \frac{M}{y} \text{ sq. ft.}$$

Practical Application

Assume $y = 3$ lb. of clinker made in the kiln per 1 lb. of standard coal burnt (*i.e.*, a fuel consumption of 33%, which is by no means unusual in the ordinary rotary kiln).

Then $S = 315.7 \frac{M}{3} = 105.2\, M$ sq. ft. (6)

or to every 1 ton of clinker made per hour we must allow 105.2 sq. ft. in the clinkering zone.

Hence we obtain the following table:

TABLE I—SHOWING NECESSARY SURFACE OF CLINKERING ZONES FOR VARIOUS TONNAGES OF CLINKER FROM KILNS WITH A FUEL CONSUMPTION OF 33% PER 100 TONS* OF CLINKER

Formula $S = 105.2\, M$.

Clinker, tons* per hour, M	Surface of clinkering zone, sq. ft., S	Clinker, tons* per hour, M	Surface of clinkering zone, sq. ft., S
1	105.2	11	1157.0
2	210.4	12	1263.0
3	315.6	13	1368.0
4	420.8	14	1473.0
5	526.0	15	1578.0
6	631.2	16	1683.0
7	736.4	17	1788.0
8	841.6	18	1894.0
9	946.8	19	1999.0
10	1052.0	20	2104.0

Length of Clinkering Zone Appertaining to a Given Diameter and Clinker Output

In the preceding sections the correct surfaces have been calculated for a given clinker output, and a definite law expressed by the formula

$$S = 105.2\, M \text{ sq. ft.}$$

was found to apply.

This law, in conjunction with the law explained in Part III (Rock Products, September 13, 1930) connecting output with diameter, enables us to calculate the length of the heated surface of the clinkering zone for a kiln of any given diameter:

*Tons in each instance are British tons of 2240 lb. To convert to tons of 2000 lb. multiply by 1.12.

Let the output be M tons of clinker per hour.

Let the diameter (reckoned brick surface to brick surface) be d ft., when the connection between M and d is given by the formula of Part IV, viz.:

$$M = 0.1123\, d^2, \text{ or } d = 2.98 \sqrt{M} \quad (1)$$

Let L be the required length of the clinkering zone and S the necessary surface for an output of M tons* an hour.

Then $S = \pi\, dL$ .....(2)

and therefore $L = \frac{S}{\pi d}$ .....(3)

Substituting $S = 105.2\, M$

and $d = \sqrt{8.90\, M} = \sqrt{\frac{890}{100}}\, \sqrt{M},$

or $d = 2.98 \sqrt{M},$

we have $L = \frac{105.2\, M}{\pi \times 2.98 \sqrt{M}}$

$$L = \frac{35.3}{\pi} \sqrt{M} \quad \text{.....(4)}$$

$$L = 11.24 \sqrt{M}.$$

Hence the length L of the clinkering zone for a given clinker output M tons*/hour can be easily calculated.

Hence we obtain the following table (This formula is new):

TABLE II—SHOWING CONNECTION BETWEEN OUTPUT AND DIAMETER AND LENGTH OF THE CLINKERING ZONES OF A CEMENT ROTARY KILN

Output, tons*/hour, M	Length of clinkering zone, $L = 11.24\, M$	Inside diameter of clinkering zone, brick to brick	Inside diameter of iron sheet of clinkering zone, allowing 9-in. brick lining
		Ft. In.	Ft. In.
1.01	11.24	3 0	4 6
1.80	15.06	4 0	5 6
2.81	18.88	5 0	6 6
3.20	20.12	5 4	6 10
3.40	20.70	5 6	7 0
3.80	21.92	5 10	7 4
4.00	22.47	6 0	7 6
4.80	24.61	6 6	8 0
5.30	25.85	6 10	8 4
5.50	26.3	7 0	8 6
6.30	28.21	7 6	9 0
7.20	30.12	8 0	9 6
8.10	32.04	8 6	10 0
9.10	33.95	9 0	10 6
11.20	37.65	10 0	11 6
13.00	41.47	11 0	12 6
16.20	45.20	12 0	13 6
19.00	49.00	13 0	14 6
22.00	52.72	14 0	15 6
25.30	56.53	15 0	16 6
28.70	60.25	16 0	17 6
32.40	63.95	17 0	18 6
36.40	67.78	18 0	19 6
40.50	71.48	19 0	20 6
45.00	75.4	20 0	21 9

(To be continued)

Preparing Geological Map

OLAF P. JENKINS, chief geologist of the state of California, is supervising the preparation of a new geological map of the state to be drawn on the scale of 1: 500,000, or 8 miles to the inch.

British Investigating Weathering of Building Stones

THE STUDY OF scientific building research in Britain has been carried a stage further by the publication of the report of the building research board of the Department of Scientific and Industrial Research for 1928. In this report weathering of stone is discussed minutely, and chapters are devoted to experiments with materials and the cause and cure of defects.

The accumulation of data necessary to the establishment of a science of building is described as having made good progress during the year, and in certain directions it is becoming possible to formulate generalizations of wide significance. This, the report says, is particularly true in the investigations into the weathering of building stones.

While in the present stage of development the study of weathering phenomena may seem to become more complicated as further advances are made, the report declares, it is now possible by examining a building stone in the laboratory to predict in general terms whether it is unlikely to weather well in use. Some steps have also been made towards placing a set of stones which are similar in type in an approximate order of resistance to normal weathering. This must, however, not be taken to imply that it is possible to guarantee the life of a stone, for it is to be remembered that much depends on the local conditions of exposure in a particular building.

During the year under review work has been concentrated largely on: efflorescences, their causes, effects and prevention; factors influencing the distribution of moisture; selective decay; biological agencies in stone decay; the action of calcium sulphate; the action of frost; tests for estimating resistance to weathering; remedial measures.

In addition, a considerable amount of work has been carried out in connection with the selection of a suitable stone for the repair of the Houses of Parliament. The board was able to recommend the stone best suited to resist the London atmosphere.

Find New Irish Mineral

AN INTERESTING new mineral has been discovered in the Scawt Hill section of County Antrim, Ireland, according to C. E. Tilley and M. H. Hey, writing in *Mineralogical Magazine*. Scawtite is the name given the new product which is found in vesicles in the mellilite-bearing rocks of the district, associated with calcite, thomsonite and another undetermined zeolitic mineral. It is colorless with a vitreous luster. The habit is that of plates flattened in plane of principal cleavage. The d. = 2.77, hardness 4½-5, $\alpha = 1.597$, $\beta = 1.606$, $\gamma = 1.621$. Optical sign is positive. β = b, γ: (001) = 29 deg. Chemical composition: CaO 46.4, SiO_2 34.2, CO_2 18.0, sum 98.6%. This indicates the formula is $6CaO{\cdot}4SiO_2{\cdot}3CO_2$.

Lime and limestone plant of the Whiterock Quarries at Pleasant Gap, five miles south of Bellefonte, Penn.

Pennsylvania Lime Producers Learn Readjustment

Prospering, at Least Moderately, in Spite of Depression—The Whiterock Quarries an Example

By W. B. Lenhart
Associate Editor, Rock Products

IN COMPARING the general condition of the rock products industries throughout the states of Pennsylvania, New York, Maryland, Connecticut and Massachusetts with the other basic industries, one is immediately struck with the thought that they are in a very fortunate position. True there are certain localities that are hard hit; the failure of the railroads to buy ballast has curtailed some on their operations and the blast-furnace fluxstone producers have suffered losses in sales volume due to the depression in the steel industry; the glass sand producers have suffered some from the decline in general building; but striking an average, as most of the producers said to me in answer to my inquiries: "We are getting our share." I could cite several instances where plants were working throughout the entire daylight period. Many aggregate producers were on an 8- to 10-hour basis. Strange to say many of the lime producers are leading the field in the upward trend.

Colonel Leonard P. Ayres, Cleveland (Ohio) economist and banker, in a recent issue of *Collier's* makes some interesting comments on the causes and prevention of that portion of the business cycle, the depression. He states: "Preparation not prevention," is the solution of this economic problem, pointing out that we have a profound economic depression every week-end, Sunday. But, having adjusted ourselves to that condition, the depression goes by unnoticed. So it would appear in the lime industry. Having been in a depression, one might say for several years and having made adjustment to meet conditions, Pennsylvania lime producers have reorganized their quarry methods, increased their plant efficiencies, cut out useless overhead, and made all the products of the plant and quarry contribute to the profit side of the ledger. The spalls or fines from lime quarry operations were at one time a problem. Now they are a blessing.

This period of readjustment has taken several years, while at the beginning of the present year when other industries were starting on the toboggan we find many of the lime producers sailing along on an even keel. Fortunately the industrial or chemical markets for lime did not slump to any great extent, and with the increased highway program in the East, particularly in Pennsylvania, the aggregate end of the lime manufacturer's business more than carried and offset any losses in the building lime markets.

Take the area within the rectangle formed by the towns of Bellefonte, Tyrone, Huntington and Lewistown, all in central Pennsylvania, within which are such operations as the American Lime and Stone Co., at Bellefonte and Tyrone; the Whiterock Quarries and the Chemical Lime Co. at Bellefonte; the Bethlehem Mines Corp., and the National Limestone Co., at Naginey, the Tyrone Lime and Stone Co. at Tyrone.

There is a section to the north and east of Bellefonte where a large section of country is apparently not served by any aggregate producing plants. Geologically, the area is of such a nature that no aggregate material is available that could pass the state's specifications. Towns such as DuBois, Clearfield and others in that section depend almost entirely on the aggregate producers within the rectangle previously referred to; the coarse aggregate (which is crushed limestone) comes from the Bellefonte, Tyrone and Naginey areas. Southward from Bellefonte the sand for building purposes practically all comes from the operations of the glass sand producers or is "imported" long distances.

Limestone sand (crusher) for aggregate is now being produced by the Bethlehem

Dump wagons used in removing overburden at Whiterock quarries

Mines Corp., at its Naginey plant, some 15 miles north of Lewistown. This is a flux stone operation primarily with the fines from the operation prepared and sold as road stone and concrete aggregate. This operation was described in detail in the July 6, 1929 issue of Rock Products.

Bellefonte Lime Industry

In the lime-burning district of Bellefonte, the largest and perhaps the most known operation is that of the American Lime and Stone Co. This company secures its stone from underground mining operations that have been described in several previous issues of this publication, as well as the rotary-kiln lime plant, so no further reference will be made here to its operations.

A consolidation took place in this district recently when the Chemical Lime Co. was merged with the Centre County Lime Co. and now operates under the name of the Chemical Lime Co. The old plant of the latter company is now undergoing extensive alterations, particularly the crushing plant, for preparation of crushed-stone aggregate. The stone from this operation is all washed.

The other lime and limestone producer in this area is the Whiterock Quarries, located at Pleasant Gap, about five miles south of Bellefonte on the Pennsylvania railroad. This company also has a large acreage nine miles from Bellefonte on which are located excellent deposits of high calcium limestone. Later this year the company expects to develop the deposits and erect a modern lime-burning and hydrating plant, as well as facilities for the production of furnace flux and road stone. The Whiterock Quarries, at its new location will be more advantageously situated to make railway shipments as it will be served by both the Pennsylvania and the New York Central railroads. Most of the rest of this article deals with the operations of this company as more or less typical of the methods and enterprise of a Pennsylvania lime manufacturer.

Whiterock Quarry Operations

At the present operations of the Whiterock Quarries there are six different quarries from which stone is taken. Recently sinking was started on the floor of the No. 5 quarry, which when it has been opened up to the desired depth will be the No. 7, and, when the stone from this floor has been removed, it is intended to start the development of an underground mining system, probably using modified stoping methods. By this procedure the operators expect to secure a high grade rock that will not be contaminated by any surface materials.

Short shafts characterize kilns at Whiterock plant

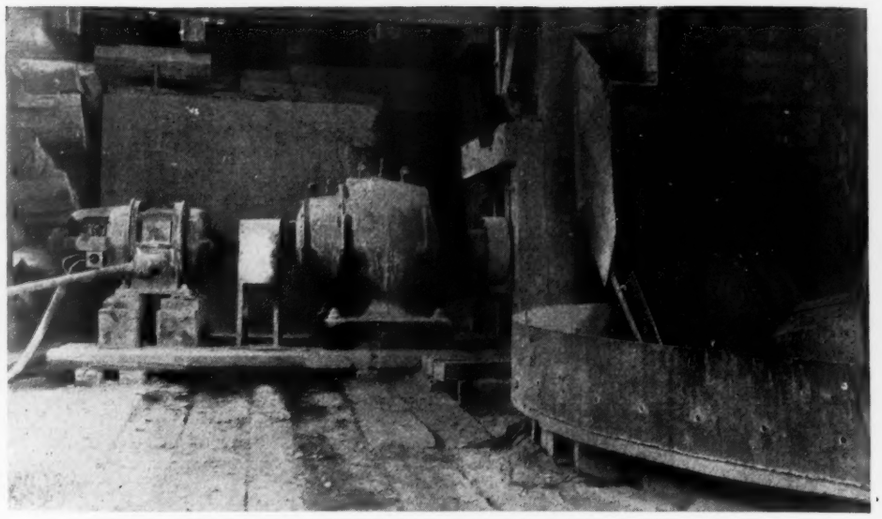
At present the small amount of overburden is removed by steam shovels that load to La Plant Chote dump wagons, each wagon having bottom dumps and holding 5 cu. yd. These special wagons

Quarry views taken at Whiterock operation. Hand loading is employed at all pits

are pulled by a No. 60, Caterpillar tractor. The wagons have steel bodies and are said to be quite satisfactory for the work.

Primary drilling in the various quarries is done by Cyclone well drills using 8-in. holes. Ingersoll-Rand, Sullivan and Chicago Pneumatic hand-hammer type air drills are used for secondary drilling. Both du Pont and Hercules explosives are used (40%), which are exploded with Cordeau-Bickford fuse.

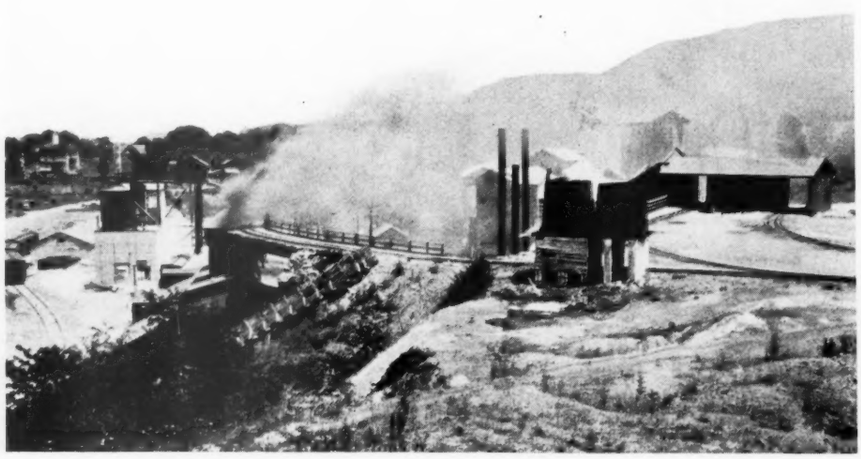
Owing to the necessity of a clean "one man-sized" stone for the lime kilns (the company has 18 vertical kilns) and the diversity of other products made at the plant from the different grades of stone, hand loading is used in all of the pits. The men are paid by the yard (approximately 20 cents per yard for stone loaded). Both Easton and Koppel cars are used. These range in size from 2 to 2½ yd. The company has 65 of the larger size and 255 of the 2-yd. cars. The cars are hauled to the plant, a distance of 1½ miles from the more distant openings (some of the openings in the hillside being only a few hundred yards from the plant), by two 8-ton Plymouth locomotives and two Baldwin steam locomotives. A Fordson tractor is also available for miscellaneous haulage around the plant and quarry.



Motor and gear reduction unit used on pan feeder to the primary crusher at Whiterock quarry

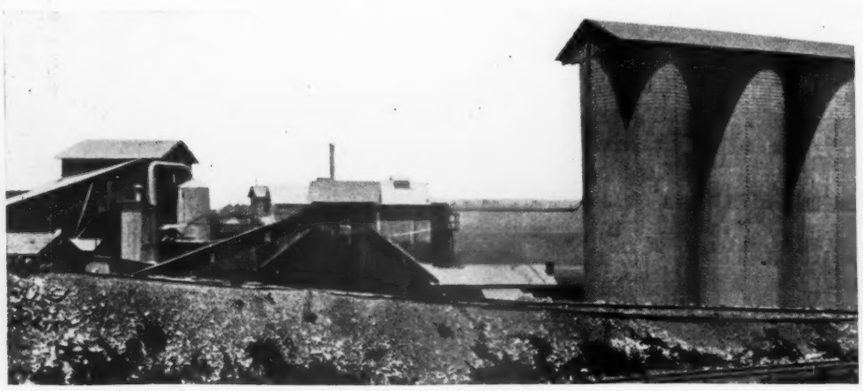
Lime-Kiln Capacity Increased by Forced Draft

The kilns, until recently, had a capacity of 6 tons of burned lime per day; but considerable experimental work was done to bring up this production, which has resulted in each kiln turning out about 8½ tons of lime per day. The increase in production was brought about by installing a 6-in. pipe in the fire box below the grate, and in this pipe placing a ½-in. air pipe that "jets" into the under-grate area. This mounts to forced draft. It is a very simple installation as it now stands but one that required considerable "fussing" to get it to function right. There are two fire doors to each kiln both of which are provided with one of these jets.



Stone is hauled directly from the quarry over the tops of the kilns at Whiterock

Owing to the shortness of the shaft of each kiln (they are only 28 ft. high from the firing floor) the management does not consider automatic firing devices desirable and continues to hand stoke using coal for fuel. It is expected to put in a rotary-kiln installation soon, and a site has been leveled off near the present plant for that purpose. One of the kilns is expected to be installed next spring.



Silos with a capacity of 2500 tons of pulverized limestone at Whiterock plant

Crushing Plant

The kiln-size stone is hauled directly from the quarry over the tops of the kilns and dumped. Stone for the aggregate plant is dumped to a steel hopper served by a 36-in. Link-Belt, pan conveyor driven by a 10-hp., General-Electric induction motor through a Foote reduction unit. The pan conveyor feeds a No. 7½ Allis-Chalmers gyratory that has a corrugated head. For secondary crushing a 4-ft. Symons cone crusher is used; both crushers are driven from a line shaft by a 180-hp. Chandler and Taylor steam engine.

For scalping a "Hum-mer" screen is used. This is an unusual adaptation of this type of screen for the work and was installed more or less under pressure, for at that time changes in specifications made a scalper necessary. The screen was hurriedly installed and has worked out more than satisfactorily, according to the superintendent, Wilber Saxion. The Hum-mer used as a scalper has 1¾-in. wire cloth. The oversize discharges to a belt conveyor serving a 6-ft. by 12-ft. rotary screen having 5-in. perforations.

Vibrating screen for producing various sizes of commercial rock at Whiterock plant

The throughs from this screen fall to bins and are shipped for furnace flux, and the oversize is chuted to the cone crusher. The fines from the scalping screen pass to a bucket elevator that serves a 3-ft. by 6-ft., three-deck Niagara screen which produces the various sizes of commercial stone. The fines from the Niagara screen are used for the preparation of pulverized limestone.

Pulverized Limestone

For the production of agricultural limestone a Williams mill and a Stroud mill are available. For coal-mine dusting and asphalt filler, which require a fineness of 85% minus 200-mesh for the former and 90% minus 200-mesh for the latter, two Kent mills are used, that operate in closed circuit with an 8-ft. Sturtevant air separator. The first one of the Kent mills was installed several years ago and proved so satisfactory that a second was installed recently. Indications are that more fine grinding equipment will be installed to handle the growing volume of pulverized material that is being marketed.

The rock before passing to the pulverizing mills goes over a Dings, block type magnet. This is simply a magnetized block of iron that is part of the bottom of the chute and any iron passing down the chute is caught. It was said that a railroad spike could be picked out of a stream bed 3 in. thick, held firmly, and would not be "washed" off by heavier charges of material. The block also collects and holds any iron that may be mixed in with aggregate of a 3-in. size. (The magnet is supplied with direct current from a 1½-kw., General Electric generator, Type BD33, Form A, that is direct-connected to a 2-hp. induction motor, 3-phase, 60-cycle and 220-volt.)

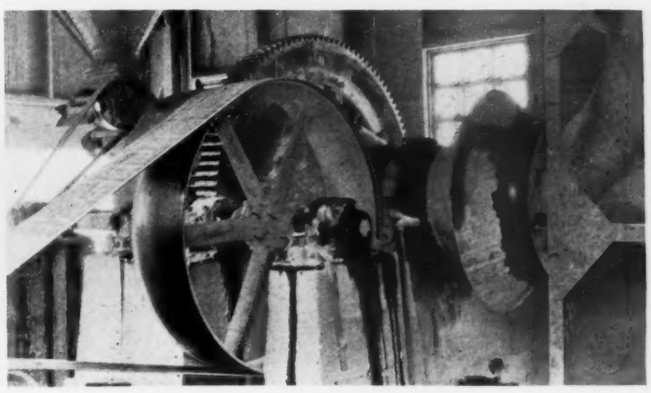
The Kent mills discharge to a bucket elevator serving a Hum-mer screen, the fines passing to the Sturtevant collector which removes the fines and returns the oversize to the pulverizers. The oversize from the vibrating screen, which is about the size of wheat grains, is sold as "glass-house" furnace flux stone (plus 10-mesh and minus 30-mesh).

The Kent mills are said to have a capacity of 3 tons per hour at the fineness of 85% minus 200-mesh when used in con-

Hand loading method is employed at Tyrone Lime and Stone plant

View of the crushing and screening plant at Tyrone Lime and Stone Co., Tyrone, Penn. Pulverizing building is at the extreme right

Tyrone Lime and Stone Co., Tyrone, Penn., pulverizing plant



Pulverizing agricultural limestone at Tyrone

The pulverizing plant of the Tyrone Lime and Stone Co. from another angle

nection with the Sturtevant air separator. Each is driven by 50-hp., General Electric, induction motor through a Texrope drive. The Stroud mill and the Williams mill are driven by 40- and 75-hp. motors respectively.

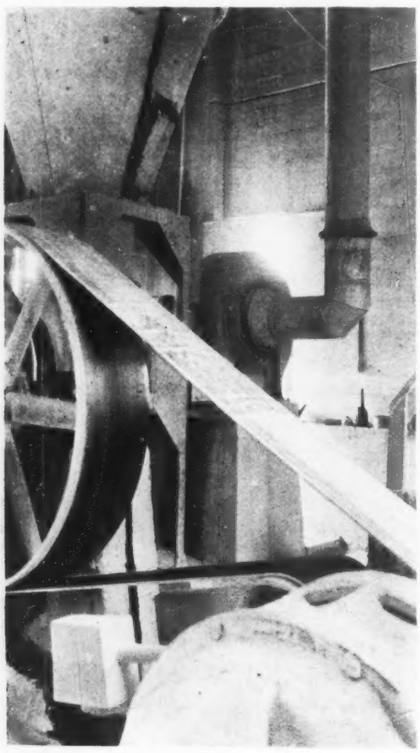
The pulverized limestone from the Sturtevant separator passes to a 3-in. Fuller-Kinyon pump and is delivered to three concrete silos holding a total of 2500 tons.

Air for plant and quarry purposes is supplied by an Imperial, Type 10, Ingersoll-Rand compressor, now driven by a 125-hp. Westinghouse motor. In addition, a Hall Steam Pump Co. compressor was recently installed that is driven by a 200-hp. motor through a short center belt drive.

Hydrating Plant

In the hydrating plant a Kritzer hydrator is used, the hydrated lime being pulverized in a Raymond mill and sacked in Bates packers. Some quicklime is sold which is ground in a small set of vertical burr stones. This material is for the most part shipped in steel barrels or tarred, burlap, paper-lined bags made by the Chase Bag Co.

The plant has a capacity of 55 cars per day, 7 to 15 cars being burned lime, 6 cars pulverized material and the balance commercial aggregate. Ray C. Noll is general manager of the Whiterock Quarries.



Another view of the pulverizer at the Tyrone plant

Other Crushed-Stone Operations

In the Tyrone district are three crushed-stone operations; the American Lime and Stone Co., the Pittsburgh Limestone Co., and the Tyrone Lime and Stone Co. The two former produce flux stone, largely. The latter plant produces a high calcium stone, that for the most part is shipped for commercial aggregate, although pulverized limestone for mine dusting, agricultural purposes, etc., is also prepared at this operation.

The plant uses a No. 8 McCully as a primary breaker and a No. 7½ Gates as a secondary crusher. The larger sizes of stone are prepared with rotary screens and the smaller sizes on a Niagara and a Link-Belt vibrating screen. No washing is done.

For the agricultural limestone a Hardinge mill is used in conjunction with that company's separators. The mill on dry stone has a capacity of 5 tons per hour at a fineness suitable for the purposes intended. The mill requires 75 hp. to operate and carries a ball load of 4 tons of steel balls.

The offices of the Tyrone Lime and Stone Co. are at Tyrone. Arthur Vaneman is president.

Railway Curtailment of Maintenance Affects Demand for Ballast

THE *RAILWAY AGE* calls attention to the "striking uniformity" in the changes that have occurred this year in both the total earnings and the operating expenses of the three large groups of railways, eastern, western and southern.

"In the first seven months of the year," says the *Railway Age*, "the gross earnings of the eastern lines declined 12.7%; of the western lines, 13.6%, and of the southern lines, 13.7%. During the same period the reduction of operating expenses of the eastern lines was 8.9%; of the western lines, 8.8%, and of the southern lines, 9%. These figures show that the earnings of railways throughout the country are being affected to almost exactly the same extent by the depression, and that their managements have been adopting strikingly similar policies to solve the problems presented. The eastern lines have earned at the annual rate of 4.13% on property investment, the western lines, 3.33%, and the southern lines, 2.68%.

"The large classes of expenses are those for 'transportation' and 'maintenance.' A reduction of 'transportation' expenses usually is a real saving, while liberal expenditures for maintenance are necessary to keep railway properties in good condition to render service. The decline in total earnings averaged 13.2% in the first seven months of the year, having constantly increased from about 7.5% in January to over 18% in July. The reduction of transportation expenses during the seven months averaged 8.3%, and in July was 11.7%. The reduction of expenditures for maintenance averaged 11% and in July was almost 20%. Expenditures made for maintenance of way in June and July were the smallest since 1918, and expenditures for maintenance of equipment in these months were the smallest since 1917.

"The properties of most railways were in excellent condition, and the necessity for the marked changes in maintenance policy that are occurring is highly regrettable. It is bad for the railways, because curtailment of needed maintenance work tends to increase transportation expenses, and, later, maintenance expenses also. From the standpoint of travelers and shippers the deferring of maintenance is highly undesirable, because it increases the difficulty of furnishing safe, speedy and reliable service.

"During recent years it has been constantly pointed out that even in years of prosperity the railroads were unable to earn anywhere near a fair return, and that, therefore, the return earned by them was sure to become dangerously small in case of a serious depression. Unless in future the railways earn larger net returns in good years there will always be danger that they will be crippled by depressions. The industry and commerce of the United States cannot afford to be dependent for transportation service on a crippled railway system. Fortunately, the trend of freight business recently has been improving slightly."

Study of a Group of Crushing Plants in the Central West

Part III—Drilling and Blasting Operations

By Earl C. Harsh
Associate Editor, Rock Products

AS STATED in previous articles of this series, the object of these articles is to describe and discuss constructively various kinds of operations essential to the production of commercial crushed stone. There were some thirty plants and quarries included in the investigation, which for various reasons it is desirable not to identify by name or location. All the quarries are in the same or similar limestone formations in the east-central west states.

Drilling

Drilling of the holes for blasting at the quarries under consideration is done with blast-hole drills, or the so-called well-drilling machines, at all except one, where a wagon-mounted air-drilling rig is used.

The blast-hole drills include an Armstrong and several Cyclones, but most of them are Loomis clipper drills, using 5⅝-in. bits and drilling holes suitable for 5-in. by 16-in. sticks of dynamite. About 85% of the drilling rigs are mounted on wheels, while 15% are crawler-tread mounted. More than 90% are electric-motor driven, with 12-hp. to 15-hp., slip-ring, variable-speed motors, while the remainder are equipped with gasoline engines.

The electric motor drive is of course desirable because of the ease with which the speed may be varied to suit drilling conditions, as well as from the standing of convenience and economy.

At the smaller quarries one drill takes care of the necessary drilling, but two or more are used where the output of rock is 1500 tons or more per day, or where the spacing of the holes is such as to require more drilling.

The drilling speed of these machines varies, of course, with the nature of the rock and the size and weight of the machine, the older machines averaging about 50 to 60 ft. per 10-hr. day, while a few of the newer machines drill as high as 80 to 90 ft. per 10-hr. day.

In passing, it should be noted that the holes are drilled as a rule to a depth 2 or 3 ft. below the level of the quarry floor in order to break up the rock down to the floor or bring up the bottom as much as possible and minimize delays which would result from the shovel digging in rock which had not been broken.

The spacing of the blast holes varies from 8 ft. by 9 ft. up to 20 ft. by 20 ft., depending upon the hardness, toughness and stratification of the rock and the depth of the face being worked, and the best spacing is arrived at only through careful inspection and calculation, and particularly by a careful study of the results of previous shots, and is of course subject to variation from time to time.

As a general proposition those rocks which are rather thinly stratified may be successfully quarried out with the holes spaced farther apart and with less explosive per ton of rock than in the case of more thickly stratified stone, but so many variables enter in that no general rule may be given.

The stratification varies all the way from 1 in. up to 2 or 3 ft. in thickness at the different quarries, and as a rule varies quite a little from the top to the bottom of each quarry, the strata being generally thicker toward the bottom. In a few cases where this is not true, and where the strata are rather heavy all the way up, it has been found desirable to separate the explosive charge into two or three sections with troughing between in order to get the best results from the explosive.

Remarks on Spacing Holes

The proper spacing of the holes and the amount of explosive which should be used in each is largely a matter of judgment based on past experience and is variable—

Wagon mounted air drilling rig which drills a 2-1/4-in. hole at the rate of 20 ft. per hour using hollow steel rods up to 20 ft. in length

Typical electric motor driven blast hole drilling machine

Left, moderately heavy stratification, and an example of where the original blast did not break up the rock sufficiently and where an excessive amount of secondary drilling and shooting had to be done

meaning that each new shot may bring out variations in the stratification and nature of the rock; and while these variations may not affect the finished product, they do materially affect the quarrying, and may call for a different spacing and differing loading.

Of course, the whole purpose of the drilling and blasting is to break down the rock with such sizes as may be conveniently loaded and readily fed to the primary crusher without an undue amount of secondary drilling and blasting and without delays at the crusher. If good breakage is not obtained, then naturally the cost of quarrying is run up by delays and wear and tear on the shovel, excessive secondary drilling and blasting, and probably further delays at the crusher. So proper drilling and loading are of the greatest importance for economical quarrying.

At the quarries under consideration the extreme close spacing of holes of 8 ft. by 9 ft. at one quarry gives six tons of rock per foot of hole drilled, while the extreme wide spacing of 20 ft. by 20 ft. at another quarry gives 33⅓ tons of rock per foot of hole drilled (12 cu. ft. of solid rock equals 1 ton). In the first case the rock is in quite thick strata, and in the second place it is thinly stratified.

The average of all the quarries is 15 tons of rock per foot of drilling, equivalent to a spacing of 13½ by 13½ ft. The spacing is, of course, more a question of the character of the rock than of the height of the face.

The face at these quarries varied from a minimum of 17 ft. to a maximum of 67 ft., with an average of 35 ft. One-half of the quarries have a working face of 30 ft. or less, while two-thirds have a working face of 40 ft. or less.

Loading Holes

The loading of the blast holes is based on the ratio of tons of rock to pounds of explosive which has been found most effective in previous shooting, taking account also of any variation in the rock. The lowest ratio is 2½ tons per pound at several quarries where the stratification is rather thick, and the highest ratio is 6 tons per pound at one quarry where the rock is well stratified and also has vertical seams. At several quarries where the rock is rather thinly stratified a ratio of 4¾ to 1 is obtained. The average for the whole group is 3½ tons of rock per pound of explosive.

Various dynamites and blasting powders are used, mostly of 40% strength, but with some 60% in the lower part of the holes when the rock is in thick strata. Cordeau-Bickford fuse is used generally and is set off either with electric detonators or safety fuse.

Varying numbers of holes are shot at one time, from one hole at a time in one quarry up to as many as 175 or more in others, and in one, two or three rows; in some cases with, and in other cases without, a toe or bank being left in front to hold in the force of the explosive.

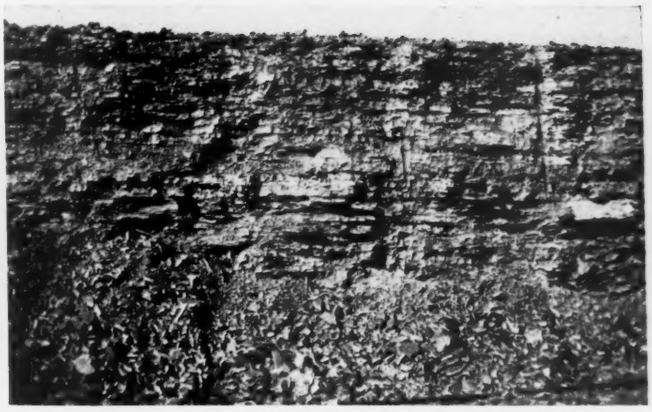
As a rule, the more thinly stratified and more easily broken stone is shot without any bank in front of it, while in the case of the more heavily stratified stone some bank is allowed to remain in front and assist in confining the force of the explosion and shattering the rock without throwing it.

Unusual Blasting Method

At one of these quarries an unusual and interesting method of shooting and working out the face is used. At this quarry the face is about 52 ft. deep at present, and the holes are spaced 25 ft. apart and 15 ft. back from the face and are staggered. Because of the nearness to the town any damage from blasting is avoided by shooting only one hole at a time, this being a matter of 400 or 500 lb. of dynamite. Formerly, a single row, shot one hole at a time, was worked out along the whole face, moving the quarry loading track in for each row, but it was found that another sequence of shooting accomplished the same result with only about one-half as much track shifting. In other words, by leaving part of the blasted rock as a toe in front of the face and shooting diagonal holes successively along the face, two rows of holes are shot and shovel loaded before the track must be moved in for the next cut. The holes are staggered, or in other words the holes in the second row are midway between those in the first row, and they are shot diagonally, that is, the hole in the second row next to the shovel is shot successively with the hole in

View of a quarry face with rather heavy stratifications

Effect of a blast on a quarry face with medium stratification. Well drills in background



A sample of quarry face with thin stratification easily broken down into small pieces

the first row one and one-half spaces or 37½ ft. beyond, thus blasting off the rock along a line diagonal to the face. Each set of two holes is shot with a slight interval between, and of course the shovel is moved back for each shot, but the moving is only a short distance and a matter of a few minutes, as the rock does not throw appreciably. This method is followed for two cuts or four rows of holes, and then a single row is worked out before repeating the procedure.

Wagon-Drill Experience

The single exception to the general use of blast-hole drills, in these quarries, is at one of the small operations where the quarry location is right on the edge of town. In order to avoid or minimize complaints from blasting it was considered advisable to use smaller charges and keep down the amount of explosive set off at one time. This was accomplished by using an Ingersoll-Rand, wagon-mounted, air drill with 2¼-in. bits, drilling holes suitable for 2-in. dynamite, and working on a 17-ft. face. The holes are spaced 6 ft. apart each way and are loaded with only about 20 lb. of dynamite each. They are shot in three rows against a bank in front, and not more than 30 holes are shot at one time. This method seems to reduce the concussion from the blasting, but because of the rather heavy stratification of the rock, considerable secondary drilling and blasting is necessary to bring it down to a satisfactory size for feeding to the primary crusher.

The drilling speed of this air drill is about 20 ft. per hour, or some three or four times that of the blast-hole drill, but the power required to produce the compressed air for its operation is three to four times that required to operate a blast-hole drill, and five to six times as many holes are required, so that it is not as a rule as economical an operation as the blast-hole drill for this particular work.

Using a heavy iron ball with the shovel to break up oversize stone

Secondary drilling of those pieces of rock too large to be loaded by the shovel or too large to be fed satisfactorily to the primary crusher is necessary at most of these limestone quarries, and is done with Jackhamer air drills. These large pieces are then further broken up by "pop-shooting" with small sticks of dynamite.

Compressed air for the secondary drilling and any other uses around the plant is available at every plant, and is furnished by electric-motor-driven air compressor units at each, except at a few of the older steam driven plants were steam driven compressors are used.

Secondary Drilling

The motor-driven compressor units range in size from 200 cu. ft. per min. up to 500 cu. ft. per min. capacity and are driven by 30-hp. up to 100-hp. motors. These are mostly Ingersoll-Rand with General-Electric motors and are practically all arranged with short center belt drives. Many are equipped with automatic starters for push-button control, and a few are connected up for complete automatic operation, being started and stopped by contacts on a pressure gage on the air line which serve to maintain the pressure between 85 and 100 lb.

At a few of the quarries where the stone is thinly stratified practically no secondary drilling or shooting is done. At these plants

Quarry face revealing typical stratification

Another shot that required considerable secondary blasting

Where an attempt has been made to keep the quarry floor unusually smooth. Any inequalities have been filled with fine material

Typical quarry scene showing steam shovel, well drills and a quarry floor which has not been kept very smooth

any slabs are broken by dropping an iron ball upon them from the bucket of the shovel. This simple method seems to work out quite well where the stone strata are less than 8 or 10 in. thick. The ball is about 22 in. in diameter and weighs 1500 lb. and is arranged with two holes so that a bar and chain may be used in handling it if necessary. It is kept within reach on the quarry floor near the shovel, and when needed is easily scooped up in the shovel bucket and dropped through on to the slab.

The drilling and blasting operations are of considerable importance both from the standpoint of smooth operation and cost of production. If properly done, costly delays are of course avoided at the shovel and at the crushing plant, and the production costs kept down.

These two items as a rule make up about one-fourth of the total cost of production, drilling ordinarily being about 10% and blasting or explosives about 15% of the total cost, based on the experience of this group of quarries.

(To be continued)

Discussion of Paper by S. Rordam, "High-Early-Strength Concrete"*

By Duff A. Abrams

MANY of the statements made in the paper are certain to mislead readers who do not closely analyze the tests on which they are based. The author does not present a fair case for the high-early-strength portland cements. A little familiarity with the subject would have shown him that the manufacturers of high-early-strength portland cements emphasize the concrete strengths at 24 hours and not at 3 days, as implied by the paper. If 3-day strengths were aimed at, there would be little inducement to use high-early-strength cements.

It is interesting to note that the author has selected an "ordinary portland cement" which exceeds the present specification requirements by 53% at 7 days and 32% at 28 days, whereas the "quick-hardening cement" barely meets the specification requirement for high-early-strength portland cement (A. S. T. M. Tentative Standard) at 24 hours and fails by 20 lb. per sq. in. to meet the specification requirement at 72 hours.

Concrete which gives strengths ranging from 1500 to 3000 lb. per sq. in. at 3 days can scarcely be considered high-early-strength concrete. The user would be more interested in these strengths at 1 day than at 3 days.

I have before me a series of tests of concrete on high-early-strength portland cement of a wide range of mixtures, giving strengths at 1 day ranging from 1500 lb. per sq. in. for a lean mixture to 3800 for rich mixtures. The cement varied from about 1.1 to 2.4 bbl. per cu. yd. These tests indicate that a strength of 1500 *lb. at 3 days* would have required only 2 *sacks of cement per cu. yd. of concrete,* a mixture which would be considered much too lean from other standpoints.

The author makes the following statement: "The problem which confronts an engineer, who has to prepare the specifications for a job requiring high-early-strength concrete, is twofold: Which mix will, for the least expenditure of money, give me the desired strength at the specified period, and What can I expect of this concrete at later periods?"

He states that the first question is comparatively easy to answer; but fails to give us the answer so far as tests reported are concerned. It would also be extremely interesting to those engaged in concrete design to know the methods by which he secured the exact strengths desired, with two different cements and four different design strengths.

It is impossible to arrive at a proper interpretation of the tests in the absence of the quantities of cement used, data on aggregates, water-ratio, slump, and other vital factors.

Ordinary portland cements when used in sufficient quantity to give concrete strengths comparable to that attained by the high-early-strength portland cements at early ages, will give higher strengths at later ages than the high-early-strength portlands; however when the cost of cement is taken into account and the subsequent dangers from excessive shrinkage of very rich mixtures due to evaporation of water, it will be seen that the ordinary cement is at a disadvantage.

There is a distinct place for high-early-strength portland cements as is convincingly shown by the rapidly increasing use of this type of cement for road, street, bridge and building construction and in concrete products plants.

*Published in ROCK PRODUCTS, August 30, 1930, pp. 45-46.

Geological Research

THE STATE of California encourages search for geological data in sections where it is lacking by paying field expenses of college students.

Federal Trade Commission to Proceed with Code Revisions

REVISIONS of trade practice rules by the Federal Trade Commission will become effective as scheduled after October 25, unless specific protest against certain revisions is made by the practice conferences concerned, Commissioner William E. Humphrey declared October 2 in explaining the position of the commission.

Formal protest to the commission against the revision and rejection of certain rules because of the method and manner by which it has been proposed to revise and reject them has been made by the Congress of Industries, Secretary Otis B. Johnson said.

The protest transmitted to the commission was the result of a conference September 25 at Niagara Falls, Canada, where the commission's order was given consideration. Four resolutions outlining the position of the Congress were adopted and have been received by the commission, he said.

"We are not going to change our revisions just because general protests have been received," Commissioner Humphrey said, "and the commission has made no plans to abandon its idea of considering the revisions effective October 25. If these conferences can point out something specific which the commission cannot do, we will consider their protests, however."

The resolution of the Congress on Industries urged the commission to "abandon such procedure, to adhere to the policy upon which industries for 10 years have been encouraged by it to depend, and to adopt the policy of making specific interpretations of such rule when, as and if they are called upon to interpret or adjudicate them in connection with complaints duly presented."

Widespread revision of the trade practice rules of "about a hundred industries," Commissioner Humphrey explained, was the result of a conviction among the members that some of the rules were "illegal." It was felt that the rules should be revised to be consistent with authority granted the commission, he said, as well as to be entirely in accord with all legislation over industry.

This reason for the revision also was offered by Commissioner Charles H. March.

Standardization of trade practice rules as far as possible always has been an aim of the commission, Mr. March said, and when revision was decided upon it was felt by the commission that the opportunity to arrange uniform codes as far as possible should be taken.

The commission has not undertaken to substitute rules of its own making, Commissioner Humphrey said, discussing a point raised at the Congress meeting. He pointed out that the commission has merely rejected previously-approved rules and that the revision is in no way a redrafting of the individual rules previously decided upon.

A complaint that the commission has not "followed through on their original program or their own order of April 19, 1926, creating the Trade Practice Conference Division of the Commission" is unjustified, Commissioner Humphrey declared. This division has been in operation for four years, he said, and is a vital part of the organization.

The commission agreed unanimously, Commissioner March disclosed, on the need for a reconsideration of the rules, but there were some specific revisions concerning which division of opinion was evident.

Rules approved by the commission are not inflexible, Commissioner Charles W. Hunt remarked, and the drawing up of such a code is not a responsibility with which the commission is charged under the federal trade commission act. The conferences at which these rules are drawn up, he explained, are encouraged by the commission "as a means of indicating what is immoral business procedure."

Proposed revisions were submitted to the industries concerned, Commissioner Hunt said, after the commission had completed its study. A period of 30 days, expiring October 25, was allowed for the filing of briefs protesting against the changes, he said. In the absence of briefs against specific rules, the commission intends to reissue the rules as final on the specified date, he said.

Marquette Cement Improves Memphis Plant

WORK on two 60-ft. silos, sand and rock bins and elevators of the Marquette Cement Manufacturing Co. at the foot of Poplar avenue, Memphis, Tenn., is being rushed to completion. Work will be finished November 1. The Gauger-Korsmo Construction Co. has the general contract.

Architects are drawing plans now for a larger central mixing plant of reinforced-concrete construction to provide the building trade with both wet and dry batch mixture.

In addition to this, four new barges costing $50,000 each will be added. When improvements are completed, total amount spent will be $300,000.

The barges will join the fleet of two towboats and four barges now operating between the plant at Cape Girardeau and Memphis.

"Marquette, which operates the largest single unit plant in the cement industry, recognizes the growing importance of Memphis as a merchandise center," says Louis J. Moss, president of John A. Denie's Sons Co., Marquette distributor at Memphis.

"The new addition is being made necessary by increased volume of business due to better service being given through the Memphis distributing plant.

"Besides the large stock carried in the distributing plant, John A. Denie's Sons Co. carries large stocks in its warehouse to assure an ample supply to serve any size job.

"Future achievements follow present foresight, and both the Marquette Cement Manufacturing Co. and John A. Denie's Sons Co. are ever alert to progress."—*Memphis (Tenn.) Press and News.*

New Type of Crushed-Stone Road Base Developed

"IN THE CONSTRUCTION of crusher-run bases on desert road construction, the problem of the economical use of water in binding such bases has led to a type of construction on the California highways which we have designated as the slurry base construction," writes C. S. Pope, construction engineer, California State Highway Department, in *California Highways and Public Works.* He continues:

"Essentially this method consists of plant production of a concrete or slurry composed of crushed rock graded from 2½-in. to dust and containing about 15% of material passing the 200 mesh which has a cementing value. The method of production is as follows:

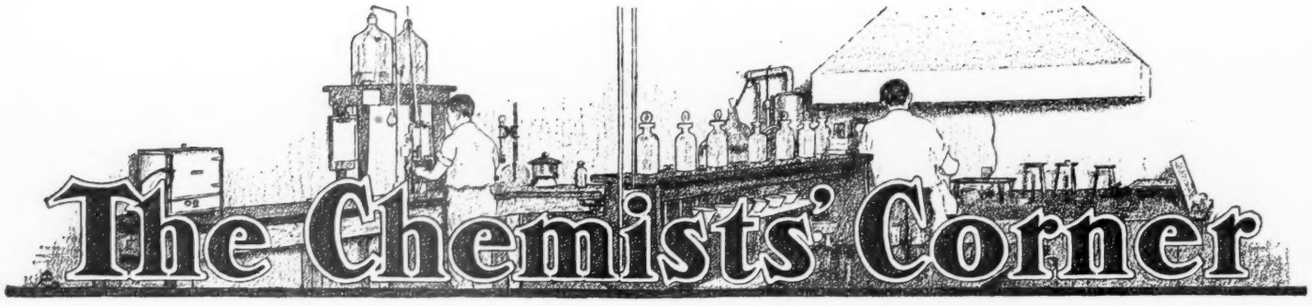
"Material for the base is obtained usually from pits or talus slopes and is crushed to the proper size in a crushing plant of ample capacity. If necessary, fine material is added to bring the 200-mesh material up to the requirements of the specifications. In order to secure accurate composition of the mixture, the material is often screened and remixed by a belt system and then passed to a mixer either of the pug mill type or revolving drum.

"The aggregate and dust are weighed out with some care or are proportioned by volume, and the water is added in an amount of about 9 gal. per ton of aggregate. It is then mixed for a period of 30 seconds and when dumped has the consistency of damp concrete. The distribution of aggregate is complete and uniform and when the material is hauled to the road it may be spread without segregation. Spreading is done by means of one-man graders or by the use of a caterpillar and blade, depending upon the quantity to be handled.

"After the material has been bladed to a smooth surface it is drenched with water to the extent of about 3½ gal. per square yard and rolled with a 10-ton roller. The appearance of the base with fine cementing slush brought out by the roller suggested the term slurry base. The resulting base is allowed to bake hard, and if the materials are properly selected the result is an astonishingly firm foundation. The base is kept sufficiently damp to protect it from raveling and is usually covered within 24 hours by an oil-mixed surfacing from 3 to 4 in. in compacted thickness.

"The method has shown a great saving in the amount of water to be used and gives a base which is far better than could be obtained by simply spreading the mixed aggregate and sprinkling and rolling in the usual way. Such bases are obtained at a cost of about $1.80 per ton, and in favorable locations no doubt this cost could be decreased.

"The success of the method has been so pronounced that it is being used on a considerable mileage of desert roads at the present time."



A Suggested Method for Proportioning and Determining the Composition of Cement Slurries

By Tyrrell B. Shertzer
Chief Engineer, Kraus Process Inc., New York

JUDGING FROM numerous articles and talks with those interested in the production of portland cement, the question of a method for proportioning the raw materials and forecasting the composition of the resulting cement clinker is a live one which does not, so far, appear to have been satisfactorily answered.

As a result of a review of existing literature on the subject, and of numerous tests and experiments, the writer has evolved a method for proportioning raw materials and computing the composition of cement clinker which he submits in the hope that it may be of interest and service to cement producers. It has been applied and tested in numerous instances during a period of several months, both in the research laboratory and also in one of the leading cement plants of the country. In every case a sound cement has been produced and in practically every case the computed composition has been checked very closely by the actual analysis of the clinker.

In the issue of Rock Products of November 9, 1929, there appeared an article by R. H. Bogue on a method for computing the compounds in portland cement. This article has been used as the basis for the evolution of the method to be described. The assumption has been made that the compounds cited in Mr. Bogue's article are the ones found in first-class portland cement and that the tri-calcium-silicate is a most desirable compound.

Bogue's Manner of Reaction

A short digest of this article embracing the salient features which are pertinent to the method to be described is as follows:

Each per cent. of SO_3 combines with 0.70% CaO to form $CaSO_4$.

Each per cent. of Fe_2O_3 combines with 0.64% Al_2O_3 and 1.40% CaO to form $4CaO \cdot Fe_2O_3 \cdot Al_2O_3$.

Each per cent. of Al_2O_3 over and above that required for the formation of $4CaO \cdot Fe_2O_3 \cdot Al_2O_3$ combines with 1.65% of CaO to form $3CaO \cdot Al_2O_3$.

Each per cent. of SiO_2 combines with 2.80% CaO to form $3CaO \cdot SiO_2$.

From the above digest, it is evident that each of the elemental constituents SiO_2, Fe_2O_3, Al_2O_3 and SO_3 requires a definite percentage of CaO to satisfy it, for the formation of the essential final compounds, so that the problem resolves itself into one of devising a simple method of ascertaining the balances between the several elemental constituents which will give the desired results.

By scanning the analysis of the clay, shale, marl, rouge, sand, limestone, cement rock, etc., which it is proposed to use in any combination for the production of portland cement it will be apparent that some of these materials are deficient in CaO and that others will have the CaO in excess. If we now determine the CaO deficiencies or excesses for each of the raw materials and tabulate and combine them in such a way as to insure the presence of the proper amount of CaO to satisfy the other elemental constituents, within proper limits, we have solved our problem.

Advantages of Shertzer's Method

One of the outstanding advantages of the proposed method of computation is that any number of raw materials can be combined in the calculations and a complete formula computed for the resulting clinker. Let us now refer to Table 1, which sets forth the shale and limestone used in the preparation of a slurry, and indicates the preliminary computations for these materials.

In the preparation of this tabulation the analysis of the raw materials are entered in the first column for the portion of the table allotted to the material under consideration.

The total percentage of SiO_2 in each case is multiplied by 2.8 and entered in the third column headed "CaO Required." The total percentage of Fe_2O_3 is multiplied by 1.4 and also entered in the third column. The total percentage of the Fe_2O_3 is then multiplied by 0.64 and the product subtracted from the total Al_2O_3 of the analysis. The difference is entered in the second column headed "Al_2O_3 Adjusted."

The *adjusted* value of the Al_2O_3 is then multiplied by 1.65 and the result entered in the third column. In the event of SO_3 being determined in the raw materials, the percentage of SO_3 is multiplied by 0.70 and the result entered in the third column. The value given for CaO is carried over direct and entered in the fourth column.

The difference between the sum of the values entered in the third column, and those in the fourth column, indicate the deficiences or excesses of CaO in the several raw materials.

In the above example we find that there is a deficiency of 183.6 CaO in the shale and an excess of 32.47 CaO in the limestone; if, therefore, we divide the deficiency in the shale by the excess in the limestone, we find that 5.65 parts of limestone are required for each part of shale to balance the CaO requirements for the compounds under the Bogue theory.

We are now ready to proceed with the computations for the slurry mixture and the composition of the slurry. These computations are set forth in Table 2. It has been found desirable not to use more than one place decimal in the proportioning of materials, for practical reasons, so that in the following computations one part shale and 5.6 parts limestone have been used. The method of computing this tabulation is quite similar to that used for the raw materials.

The chief features of the slurry computations are that each percentage of constituents of raw materials which are used in excess of one part must be multiplied by the number of parts used in order to get the total amount of each constituent carried into the slurry mixture. In this case, 5.6 parts of lime-

TABLE 1

	Shale				Limestone			
	Analysis	Al_2O_3 adjusted	CaO required	CaO available	Analysis	Al_2O_3 adjusted	CaO required	CaO available
SiO_2	54.03	.....	151.28	.....	4.94	.....	13.83	.....
Fe_2O_3	9.66	.....	13.52	.....	1.69	.....	2.37	.....
Al_2O_3	18.04	11.86	19.57	.....	1.74	0.66	1.09	.....
CaO	0.77	.....	.....	0.77	49.76	.....	.....	49.76
MgO	1.08	.....	.....	.....	0.80	.....	.....	.....
Loss	11.33	.....	.....	.....	40.11	.....	.....	.....
X	5.09	.....	.....	.....	0.96	.....	.....	.....
Σ	100.0	.....	184.37	0.77	100.00	.....	17.29	49.76

184.37 — 0.77 = 183.60 CaO deficiency in shale.

49.76 — 17.29 = 32.47 CaO available in limestone.

$\frac{183.60}{32.47}$ = 5.65 parts of limestone required for each part of shale.

TABLE 2—COMPUTATIONS FOR SLURRY

	1 shale	5.6 limestone	Σ	Al_2O_3 adjusted	CaO required	CaO available	Slurry composition	Clinker analysis
SiO_2	54.03	27.66	81.69	.....	228.73	.....	19.27	19.36
Fe_2O_3	9.66	9.46	19.12	.....	26.77	.....	4.50	3.74
Al_2O_3	18.04	9.74	27.78	15.54	25.64	.....	6.55	6.82
CaO	0.77	278.66	279.43	.....	.....	279.43	65.90	65.95
MgO	1.08	4.48	5.56	.....	.....	.....	1.31	1.47
X	5.09	5.38	10.47	.....	.....	.....	2.47	3.06
Σ	88.67	335.38	424.05	.....	281.14	279.43	100.00	100.40

TABLE 3—EXAMPLE OF COMPUTATIONS FOR SLURRY WITH MORE THAN TWO RAW MATERIALS

	1 sand	10 slag	25.7 limestone	Σ	Al_2O_3 adjusted	CaO required	CaO available	Slurry composition
SiO_2	88.88	355.00	81.21	525.09	.....	1470.25	.....	20.16
Fe_2O_3	2.19	15.40	37.01	54.60	.....	76.44	.....	2.10
Al_2O_3	4.53	135.00	23.13	162.66	127.72	210.74	.....	6.25
CaO	0.76	433.80	1323.04	1757.60	.....	.....	1757.60	67.49
MgO	0.30	48.30	39.06	87.66	.....	.....	.....	3.36
SO_3	.....	.....	.....	.....	.....	.....	.....	.....
X	1.01	12.50	3.34	16.85	.....	.....	.....	0.64
Σ	97.67	1000.00	1506.79	2604.46	.....	1757.43	1757.60	100.00

TABLE 4—DATA FOR CEMENT MADE FROM MIXTURE INDICATED IN TABLE NO. 2, BY KRAUS PROCESS

General Data for Cement

Burning temperature—Cone 17	1470 deg. C. / 2678 deg. F.
Passing 200 mesh	91.6%
Passing 325 mesh	85.9%
Initial set—Vicat	1 hr. 50 min.
Final set—Vicat	3 hr. 15 min.
Normal consistency—Vicat	24.5%
Soundness	O.K.
Raw gypsum added	3%
Free lime	0.32

Tensile Strengths—1 : 3 Standard Briquettes

24 hr.	48 hr.	72 hr.
290	382	400
310	380	395
300	345	390
300	369	395

Clinker ground in small laboratory ball mill for about 18 minutes.

stone was used so that each of the several percentages of the constituent parts of the limestone must be multiplied by 5.6 and entered in the third column of the tabulation.

As an example, take the SiO_2. In Table 1 under limestone we find the percentage of SiO_2 to be 4.94. Therefore, if we use 5.6 parts of limestone, we will have 4.94 × 5.6 = 27.66 parts of SiO_2 carried into the slurry mixture by the limestone.

The third column of the tabulation is the sum of the values given in the first and second columns and indicates the total amount of each of the elemental constituents entering into the composition of the slurry. After the values entered in the third column have been found, the values in the fourth, fifth and sixth columns are computed exactly as were those for the second, third and fourth columns of Table 1.

The values in the column headed "Slurry Composition" are found by dividing each of the items in column headed Σ by the sum of all of the items in this column. It is simply expressing the values in the Σ column in terms of percentages.

In the column headed "Clinker Analysis" is presented the actual analysis of a clinker made from the computed mixture and is given merely to show the close agreement between the computed formulas and the actual analysis.

It is evident that any number, or desired combinations, of raw materials can be included in the computation embraced in Table 2. As an example of this possibility, Table 3 is offered, without the preliminary raw materials computations, merely to indicate how such combinations can be handled.

Reverting to the values given in Table 2, the data presented in Table 4 show the properties of an actual cement made from this mixture by the Kraus Process in the experimental plant of one of the leading cement companies.

Purifying Schuylkill River

OF INTEREST in the report recently made by Lyle L. Jenne of the Philadelphia Bureau of Water describing efforts to eliminate industrial pollution of the Schuylkill river is the mention of several firms connected with our industries. Some 66 varied industrial plants are listed by Mr. Jenne as being responsible for creating a chemical taste in Philadelphia's water, half of which comes from the river to serve nearly a million people.

No names are mentioned in the report. Plant No. 9 is cited as manufacturing cement and formerly created quite a nuisance through its pulverized coal. Sprays throughout the coal-pulverizing plant washed a large amount of coal dust into the neighboring stream. It was found by experiment that this coal dust settled out in 20 minutes by plain sedimentation. The coal-dust spray is now conducted to a natural settling basin. The influent of this basin contains 300 p.p.m. suspended matter and the effluent 3 p.p.m.

The other plant, No. 56, is reported to manufacture magnesia and asbestos products. Waste water containing lime and magnesia in suspension went to an abandoned quarry, where it settled and the clear effluent therefrom went into the river. This had a high alkalinity and amounted to about 2,000,000 to 3,000,000 gallons per day.

Samples taken in 1925 showed an alkalinity averaging from 800 to 1200 p.p.m., which increased the alkalinity in the river from 10 to 20 parts at that point. A large delta formed at the mouth of this effluent and it was necessary for the company to expend considerable money to have it removed.

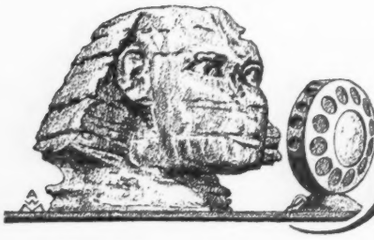
Sedimentation in the quarry has eliminated this condition. The quarry has recently become full and the waste is now again being discharged directly into the river. This waste is not considered as polluting the water supply, the only objection being the formation of a delta at the place of discharge.

New Amphibole Found

A PECULIAR BLUE-GREEN amphibole from the metamorphic iron formation of the eastern Mesabi range in Minnesota is described by Stephen Richarz in an American mineralogy journal. The mineral is associated with grunerite and quartz and forms a felted aggregate with some well defined blades. Pleochroism is strong, X light yellow, Y pea green, Z deep blue-green. The extinction angle on 010 is about 16 deg. It is optically —; $\alpha = 1.670$, $\beta = 1.690$, $\gamma = 1.696$; $2V = 54$ deg. Analysis gives: SiO_2 48.76, Al_2O_3 11.15, Fe_2O_3 7.92, FeO 21.72, MnO trace, CaO 6.16, MgO 0.38, K_2O 0.58, Na_2O 1.67, H_2O 1.89, sum 100.23%.

Diatomite in Canada

CANADA HAS a large number of diatomite deposits in British Columbia, Ontario and in the Maritime Provinces.



Hints and Helps for Superintendents

Quarry Floor Cleaner

FOR QUARRY TRUCK TRANSPORTATION a clean floor is essential, so the operators at the Steelton (Penn.) plant of the Bethlehem Mines Corp. use a drag made from two 8-in. I-beams

Drag for cleaning quarry floor

bolted together as shown in the illustration.

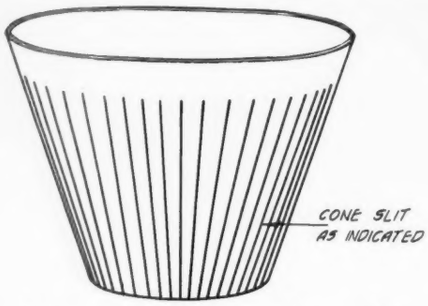
After a shot in the quarry this drag can be pulled over the roadway by the trucks (a tractor would come in handy) and the right-of-way cleared of all loose stone.

Regulating Mill Fineness

THE FINENESS of a Raymond mill is sometimes regulated by a cone installed immediately over the mill. The length and diameter of this cone governs the size of the products produced. To change the fineness of the product in such an installation the cone must be placed and often this is a laborious operation.

In a western gypsum mill, the idea was adopted of slitting the cone as indicated in the drawing and then, when a different fineness was desired, the change could be made by simply bending inward or outward these metal strips so as to enlarge or decrease the size of the cone.

The idea worked successfully when a



Cone used at gypsum mill for regulating mill fineness

cone was used made of sufficiently thick metal to withstand the air velocity encountered.

Gears Repaired by Oxwelding

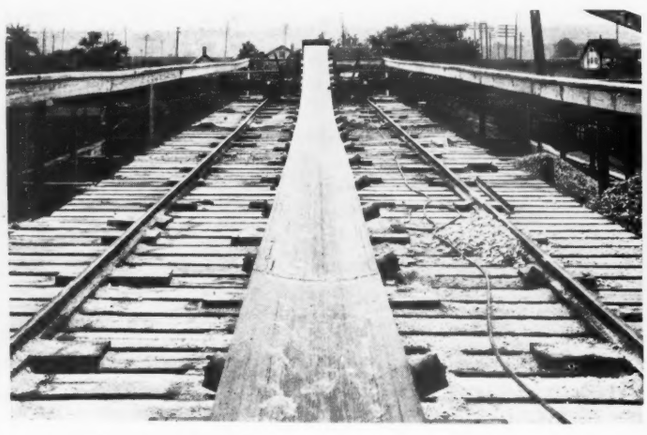
A PREHEATING furnace is usually dispensed with when putting new teeth on ordinary small gears, as all the preheating necessary can usually be accomplished by local application of the blowpipe flame itself. The accompanying illustration shows a plant welder using such a procedure. Gears of a larger size than the one illustrated are best prepared for welding by thorough preheating. This may be accomplished by the use of a gas-fired preheating torch or by constructing a temporary heating furnace of fire brick, using charcoal as fuel.

Putting new teeth on a small gear by oxwelding process

Many plant welders are able to control the flow of the weld metal so that there is little machining to be done when the teeth are completely built up. Pieces of carbon block of suitable size are easily shaped with a file so as to form a mold on either side of the tooth to be built up and aid in the control of weld metal.

Using Conveyor Units to Efficient Advantage

WITH ONLY FOUR major handling units the Botzum Brothers Co. of Akron, Ohio, can obtain any desired quantity and combination of material from their storage bins.



Figs. 2 and 3. Conveyor over top of bins with closeup of tripper and shuttle conveyor serving any desired bin

They operate a large distributing plant for building materials. The conveying equipment is designed to handle crushed stone, slag, cinders, sand, and other similar materials. Following the material from the time it is dumped from a car into the pit, a plate feeder at the bottom of the pit feeds the material on to a 24-in. inclined belt conveyor, shown in Fig. 1, by which it is carried to the top of the rows of bins, a distance of about 160 ft.

A 24-in. horizontal conveyor travels the length of the series of 12 bins, six on each side, and is provided with an automatic tripper. A shuttle conveyor is mounted on the tripper, and its cross travel permits the coverage of each bin completely. The belt, tripper and cross conveyor are shown in Figs. 2 and 3. Thus far the description shows how simply the bins are filled with their respective materials.

Beneath the bins is another 24-in. horizontal belt conveyor which runs the entire length of the bins and receives material from any one of them. See Fig. 4. This conveyor delivers the material into an elevator, Fig. 5, at one end of the row of bins, by which it is carried up into a batcher. By means of this batcher two or more materials may be weighed and combined before being dropped into trucks.

Fig. 1. Conveyor by which material is carried to top of bins

Fig. 5. Elevator serving batcher

To summarize, this equipment will deliver material from the railroad car to any one of 12 bins, collect it from any one of those bins, and carry it to a batcher where it is weighed before being dumped into a truck.

The conveying equipment was designed and built by the C. O. Bartlett and Snow Co. of Cleveland, Ohio.

A Simple "Run-Around" for the Quarry Track

QUARRYMEN operating with a railway trackage system in the quarry frequently find it necessary to install a "run-around" or siding where one quarry train can pass by another. Such a "run-around" can be made entirely automatic, thus eliminating the necessity of having one of the engine men leave his locomotive to throw the switch, or having a switchman always at the point. If two spring switches are installed, one at each end of the siding, and if these are each set to switch the trains to the right, then the trains will necessarily have to take the different tracks as they enter the double-track portion from opposite ends. A train running out at the other end of the siding will spring the far switch apart as it passes, and the lead will spring back in position after the last car is through. This system is in constant use in standard railroad engineering, but has not been commonly adapted in the rock products industry as yet.

Fig. 4. Conveyor which receives material from bins for batcher

Guard to Keep Stone Out of the Gears of a Revolving Screen

TO PREVENT stone from getting into the gears of revolving screens at the plant of the Consumers Co. at Racine, Wis., a special guard has been installed on each screen which has functioned very effectively. The guard consists of a portion of one section of a revolving screen. This portion is a little over a foot in width and some 4 ft. long. It is held in position across the lower end of the revolving screen, above the center bearing, by two brackets of strap iron. These are bolted to the guard at their upper ends and fastened to bolts on the center bearing at their lower ends. Since one bracket is made slightly longer than the other, the guard is somewhat inclined to the horizontal. The guard is set just as closely against the gears of the screen as possible without touching them, thus assuring that the gears will always be kept clear of stone.

Guard for revolving screens

An Effective Safety Reminder

A LARGE part of the effectiveness of any safety campaign is dependent upon keeping "Safety" before employes. An effective means is to imprint pay envelopes with a short, snappy safety message. These can either be printed, or stamped with a rubber stamp, with some bright ink.

Business Is Actually Picking Up!

ACCORDING to a summary of reports on business conditions made to Julius H. Barnes, chairman, National Business Survey Conference, dated September 29:

Savings—Available reports indicate that the gradual upward tendency in savings deposits which has been apparent in recent months for the country as a whole, still continues.

In August deposits in savings banks of New York state increased $20,000,000; deposits in these banks rose by $103,000,000 during the first eight months of 1930, whereas during the corresponding portion of 1929 they decreased by $75,000,000.

Building and Loan Associations—Reports from building and loan associations in twenty-four states through their national association indicate uneven but improved conditions. There are communities with a surplus of funds, little demand for loans, and normal withdrawals. In other sections there are some withdrawals, slow collections, and reports of some foreclosures. Generally, reports suggest a conservative attitude on the part of associations with respect to new commitments and a desire to care for all legitimate demands for the higher types of loans.

Life insurance companies which have 79% of mortgage loans made by all United States legal reserve life insurance companies increased their mortgage loans by $41,000,000 during July and August. At the end of August they had outstanding $1,526,000,000 on farm properties and $4,428,000,000 on other properties.

Construction Industries—For the period ended with September 19, construction of public works and utilities exceeded the volume in the same part of last year by $147,000,000, non-residential building this year was less in volume by $341,000,000, and residential building was less by $698,000,000. Total building contracts for all classes this year through September 19 were $3,574,000,000, to be compared with $4,467,000,000 in the corresponding part of 1929 and $5,126,000,000 in this part of 1928. The greatest decrease has been in residential building; in this form of construction there have been indications of a moderate revival, within the last few weeks, particularly in construction of detached one and two-family houses.

August permits for additions, alterations, and repairs in 297 cities showed a decrease in value of approximately 24% of the value in July. The value in July was 5% over the value in June.

Awards for concrete paving in August totaled 10,657,000 sq. yd., as compared with 11,968,000 in August, 1929. During the first eight months of this year such awards have exceeded the volume in the corresponding part of 1929 by 7.2%. At the beginning of September, contracts awaiting award totaled 11,309,000 sq. yd., or 19% more than the corresponding figure on September 1, 1929.

During August the cement industry operated at 81% of capacity, including two new plants and extensions and improvements at old plants this year. As usual, August production and shipments of cement reached the high point of the year. August shipments of sand, gravel, and crushed stone were approximately 10% below such shipments in August of last year, but were slightly in excess of July, 1930.

In structural steel, business has been reported as fairly brisk in New York and vicinity, and in the middle west appears to have been over last year. A decided improvement in September is reported, with a good volume of new orders reported as in prospect.

A survey covering the United States indicated that the steel construction business to September 18 has this year practically kept up to the tonnage in the comparable part of 1929. Returns to date for this survey indicate shipments of structural steel this year have at least been equal to shipments in the same part of last year, and that new orders booked have been from 25 to 40% below the bookings of 1929.

Sales of roofing and structural slate in August were 25% over sales in July, although still 50% below sales in August, 1929.

The common brick industry reports that the seasonal improvement of August is continuing in September. In face brick production and stocks have shown little change during the summer; operation was at less than 40% of capacity, and stocks were 12% below the low point of 1929.

The lime industry shows a gradual upward trend, with shipments in the first half of September 24% below September shipments last year, as against shipments in August 32% below August last year. A September improvement was apparent in all three classes of lime, chemical, agricultural, and building.

Prices for building material held almost unchanged in September as compared with prices in August. There was a slight gain in the price of crushed stone, lumber, and hollow tile, but for all other materials were unchanged. Lumber was the only building material showing an increase in price for September this year over 1929.

A nation-wide survey indicates there was a decrease in residential vacancies over the country in August as compared with July. Factory vacancies were reported to be getting close to normal in the country as a whole. Less than a normal demand for space in office buildings has been reported in most of the cities during the last three months.

Chemicals—The chemical industry advanced during August and early September. Withdrawals of chemicals under existing contracts have increased considerably since the first of September.

Demand against contracts for heavy chemicals improved during September, and shipments are reported as fair. It is stated low prices have simulated a buying movement in domestic and export trade.

Fertilizer sales in the south for the nine months of December to August this year were 99.3% of such sales in the corresponding part of last year and 99% of sales in the nine months of 1928. For August, however, such sales were 78% of those for August, 1929.

Ohio Quarry Reported Running Double Time

INCREASED orders for stone at the John Evans Lime and Stone Co., Marion, Ohio, have caused the plant to add a night shift in order to meet the demand, Dan Evans, proprietor, said recently.

The company has begun the night shift which probably will continue for at least six weeks, Mr. Evans said, until the increased orders are filled.

With the addition of 18 former employes to the night shift, the company now employs more than 40 men. The night shift lasts 11 hours and the day shift 10.

The two forces of men will be capable of producing 1,800 tons of stone at each 24-hour period, Mr. Evans said.

Electric lights which are strung over the entire quarry, which is located nothwest of the city, enable the night crew to work almost as efficiently as the day shift, it is said.

Increased orders from railroad companies for stone for ballast on roadbeds is given as the principal reason for the increased production at the Evans quarry.—*Marion* (Ohio) *Star.*

New California Limestone Operation

THE Valley Lime Co., Ltd., has been incorporated under the laws of the state of California and now owns and operates the limestone quarry and property formerly operated by the Abramson-Bode Corp. near Lindsay, Calif. A substantial tonnage of limestone is moving from the quarry now for use in chemical processes in various parts of the state. The company is not burning lime at present but is a wholesale distributor in the San Joaquin Valley for the lime products manufactured by the Diamond Springs Lime Co. at Diamond Springs, Calif.

E. H. McEuen, of Lindsay, is president and general manager of this new company. R. L. Rudkin, Tracy, is vice-president and W. J. Resch, Tracy, is secretary-treasurer.

The main office of the company is at Lindsay and the quarry and plant is located a few miles southeast of Lindsay with shipping facilities via both the Southern Pacific and the Santa Fe railroads. All the stock is held by the directors and none is being offered to the public.

Editorial Comment

A Stitch In Time Saves Nine

The members of a local chamber of commerce in a Mississippi town have been asked to purchase $50,000 in the stock of a cement-mill project, if they desire the proposed plant located in their town. It is reported that the members of this local boosters' organization have replied that they will first employ an engineer to investigate and see what they will get for their $50,000. All of which news we think is quite significant and worthy of comment.

OUR PLATFORM

¶ Greater Economy of Production; the Best in Machinery, Control Equipment; High Wages; Perfect Co-ordination. ¶ Comprehensive Organization of Industry for Research, Promotion. ¶ Retirement of the State from Competition with Private Business. ¶ Active Participation of Business Men in the Business of Government. ¶ The Promotion of Safety and Welfare of the Industry's Employes.

If the engineer selected to make the investigation is conscientious and competent as a business man as well as an engineer, his investigation is sure to reveal the following facts: That the cement mills serving Mississippi and vicinity have been unable to obtain business in profitable volume for a considerable period and the outlook for the immediate future can hardly be considered encouraging. Probably no individual mill in the entire area has shipped over 50% of its capacity during the present year; several important units of this group located on direct rail lines to leading Mississippi points, have been unable to dispose of even as much as 50% of their capacity. The behavior of general price trends under these conditions has been quite naturally downward. Plant capacity has increased by leaps and bounds while demand has been falling off. Unit operating costs have mounted, undoubtedly, since low costs are directly dependent upon near-capacity operation. No early up-trend in consumption or prices is in sight and with large supplies of finished cement and clinker now on hand, several of the mills are closing for an indefinite term of months—not a promising outlook for the owners of cement-mill stocks.

If the engineer-investigator is merely "an engineer" he will doubtless verify the fact that cement-making materials are available in sufficient quantity—but any one at all familiar with the industry, or with the geology of this country, knows that this is of no particular significance, since limestone containing less than 5% magnesium carbonate, and clay or mud, are widely distributed and easily accessible in most parts of this country. But to answer the question, "What will local investors get for their $50,000" requires that someone find out: (1) if there exists a market for cement not already sufficiently taken care of; (2) what the competitive conditions in this market are and will be; (3) what if any advantage a new mill will have over those already established in this and other markets that the new mill must invade; (4) whether the local stock subscribers are willing to forego any return on their investment of $50,000 indefinitely, and are prepared to stand for assessments of probably as much again, or more, while they are waiting for that rosy future when the demand for cement will be such that prices will permit all the mills to prosper—at which time their own mill very probably will have become obsolete, except at least for the expenditure of something more than prospective profits.

Local patriotism and a desire to bring in a new industry are laudable things. But it is high time that the members of chambers of commerce and other booster organizations went about such activities with discretion and a sense of personal responsibility.

On such men we must depend more and more to prevent recurring periods of "hard times," like the present. For that these can be prevented and business stabilized on a fairly prosperous basis no scientifically-minded and intelligent man doubts. In this connection there is one paragraph in President Hoover's address to the American Bankers' Association which all of us should keep in mind: "The economic fatalist believes that these crises are inevitable and bound to be recurrent. I would remind these pessimists that exactly the same thing was once said of typhoid, cholera, and smallpox. If medical science had sat down in a spirit of weak-kneed resignation and accepted these scourges as uncontrollable visitations of Providence, we should still have them with us. This is not the spirit of modern science. Science girds itself with painstaking research to find the nature and origin of disease and to devise methods for its prevention. That should be our attitude toward these economic pestilences. They are not dispensations of Providence. I am confident in the faith that their control, so far as the causes are within our own boundaries, is possible."

If there is such a thing as a scientific business man, in the average town's business enterprises, he ought to be found in the councils of the local chamber of commerce. He, if anyone, ought to be able to view the problem of stabilization of business and industry in a large way. He, if anyone, should recognize and assume his responsibility for stabilizing local industry. And he may well ask himself "What will I get for my own investment in this project?" For if it will not prove profitable in his own case it will not prove profitable to his community in the long run.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	9-23-30	95	99	
Alpha P. C. new com.[2]	10- 4-30	22	24	50c qu. Oct. 25
Alpha P. C. pfd.[2]	10- 4-30	118	.....	1.75 qu. Mar. 15
American Aggregates com.	10- 7-30	15	.....	75c qu. Mar. 1
Am. Aggr. 6's, bonds	10- 4-30	80	.....	
American Brick Co., sand-lime brick	10- 6-30	4½	.....	25c qu. Feb. 1
American Brick Co. pfd.	10- 6-30	62	69	50c qu. May 1
Am. L. & S. 1st 7's[29]	9-23-30	97	98	
American Silica Corp. 6½'s[19]	10- 7-30	No market		
Arundel Corp. new com.	10- 4-30	43	.....	75c qu. Oct. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	10- 7-30	No market		
Beaver P. C. 1st 7's[20]	9-18-30	95	99	
Bessemer L. & C. Class A[4]	10- 3-30	30	31	75c qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	10- 3-30	94	95	
Bloomington Limestone 6's[29]	9-23-30	72	75	
Boston S. & G. new com.[47]	10- 4-30	16	20	40c qu. Oct. 1
Boston S. & G. new 7% pfd.[47]	10- 4-30	46	50	87½c qu. Oct. 1
California Art Tile A	10- 2-30	.....	8	43¾c qu. Mar. 31
California Art Tile B[50]	10- 4-30	.....	10	20c qu. Mar. 31
Calaveras Cement com.	10- 2-30	.....	10	
Calaveras Cement 7% pfd.	10- 2-30	.....	88	1.75 qu. Oct. 15
Canada Cement com.	10- 6-30	17⅛	18⅛	
Canada Cement pfd.	10- 6-30	93	.....	1.62½ qu. Sept. 30
Canada Cement 5½'s[43]	10- 3-30	100½	.....	
Canada Cr. St. Corp. bonds[43]	10- 3-30	94	98	
Certainteed Prod. com.	10- 6-30	5¼	6	
Certainteed Prod. pfd.	10- 6-30	20½	26	1.75 qu. Jan. 1
Cleveland Quarries	10- 6-30	65	75	75c qu. 25c ex. Sept. 1
Columbia S. & G. pfd.	10- 6-30	89	94	
Consol. Cement 1st 6½'s, A	10- 7-30	70	80	
Consol. Cement. 6½% notes	10- 7-30	60	65	
Consol. Cement pfd.[29]	9-23-30	50	60	
Consol. Oka S. & C. 6½'s[12] (Canada)	10- 3-30	99	101	
Consol. Rock Prod. com.[9]	10- 2-30	1½	2½	
Consol. Rock Prod. pfd.[9]	10- 2-30	9	11	43¾c qu. June 1
Consol. Rock Prod. units	10- 6-30	13	17	
Consol. S. & G. pfd. (Can.)	10- 6-30	83	85	1.75 qu. Aug. 15
Construction Mat. com.	10- 6-30	13	14	
Construction Mat. pfd.	10- 6-30	39	39½	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	10- 4-30	88	93	
Coosa P. C. 1st 6's[29]	9-23-30	50	55	
Coplay Cem. Mfg. 1st 6's[40]	10- 4-30	95	.....	
Coplay Cem. Mfg. com.[40]	10- 4-30	10	.....	
Coplay Cem. Mfg. pfd.[40]	10- 4-30	60	.....	
Dewey P. C. 6's (1930)[39]	10- 7-30	99	.....	
Dewey P. C. 6's (1931-37)[39]	10- 7-30	99	.....	
Dolese & Shepard	10- 6-30	77	79	$2 qu. Oct. 1
Dufferin Pav. & Cr. Stone com.	10- 6-30	.....	15½	
Dufferin Pav. & Cr. Stone pfd.	10- 6-30	84	.....	1.75 qu. Oct. 1
Edison P. C. com.[39]	10- 3-30	10c	.....	
Edison P. C. pfd.[39]	10- 3-30	25c	.....	
Giant P. C. com.[2]	10- 4-30	5	15	
Giant P. C. pfd.[2]	10- 4-30	15	30	1.75 s.-a. June 16
Gyp. Lime & Alabastine, Ltd.	10- 6-30	14⅝	14¾	37½c qu. Oct. 1
Hermitage Cement com.[11]	10- 6-30	30	40	
Hermitage Cement pfd.[11]	10- 6-30	86	92	
Ideal Cement, new com.	10- 6-30	52½	54½	75c qu. Oct. 1
Ideal Cement 5's, 1943[33]	10- 4-30	99	101	
Indiana Limestone units[29]	9-23-30	.....	90	
Indiana Limestone 6's	10- 3-30	.....	69⅞	
International Cem. com.	10- 6-30	56¼	57½	$1 qu. Sept. 30
International Cem. bonds 5's	10- 6-30	100	100½	Semi-ann. int.
Iron City S. & G. bonds 6's[48]	10- 3-30	90	94	
Kelley Is. L. & T. new stock	10- 6-30	35	40	62½c qu. Oct. 1
Ky. Cons. St. com. V.T.C.[48]	10- 6-30	7	8	
Ky. Cons. Stone 6½'s[48]	10- 6-30	90	95	
Ky. Cons. Stone pfd.[48]	10- 6-30	85	90	1.75 qu. Aug. 1
Ky. Cons. Stone com.[48]	10- 6-30	7	8	
Ky. Rock Asphalt com.[11]	10- 6-30	14	16	40c qu. Oct. 1
Ky. Rock Asphalt pfd.[11]	10- 6-30	77	80	1.75 qu. Sept. 1
Ky. Rock Asphalt 6½'s[11]	10- 6-30	85	93	
Lawrence P. C.[2]	10- 4-30	62	67	$1 qu. Sept. 30
Lawrence P. C. 5½'s, 1942[2]	10- 4-30	86½	88	
Lehigh P. C.	10- 6-30	19	21	25c qu. Nov. 1
Lehigh P. C. pfd.	10- 6-30	103⅛	105	1¾% qu. Oct. 1
Louisville Cement[48]	10- 6-30	250	.....	
Lyman-Richey 1st 6's, 1932[13]	10- 3-30	97	100	
Lyman-Richey 1st 6's, 1935[13]	10- 3-30	97	100	
Marblehead Lime 6's[14]	10- 3-30	85	95	
Marbelite Corp. com. (cement products)	10- 2-30	100	.....	
Marbelite Corp. pfd.	9-20-30	12	.....	50c qu. July 10
Material Service Corp.	10- 6-30	17½	19	50c qu. Sept. 1
McCrady-Rogers 7% pfd.[22]	10- 2-30	53	55	
McCrady-Rogers com.[22]	10- 2-30	18	20	
Medusa Portland Cement	10- 6-30	.....	90	1.50 Oct. 1
Mich. L. & C. com.[6]	10- 4-30	25	.....	
Missouri P. C.	10- 6-30	29	30	50c qu. Aug. 1
Monolith Portland Midwest[9]	10- 2-30	2½	3½	
Monolith bonds, 6's[9]	10- 2-30	80	85	
Monolith P. C. com.[9]	10- 2-30	4½	5½	40c. s.-a. Jan. 1
Monolith P. C. pfd.[9]	10- 2-30	3½	4½	40c s.-a. Jan. 1
Monolith P. C. units[9]	10- 2-30	12½	15	
National Cem. (Can.) 1st 7's[13]	10- 3-30	99½	.....	
National Gypsum A com.	10- 6-30	4½	5½	
National Gypsum pfd.	10- 6-30	25	28	
Nazareth Cement com.[26]	9-19-30	22	.....	
Nazareth Cement pfd.[26]	9-19-30	100	.....	
Newaygo P. C. 1st 6½'s[29]	9-23-30	101¼	.....	
New Eng. Lime 1st 6's[14]	10- 3-30	No market		
N. Y. Trap Rock 1st 6's	10- 6-30	102⅜	102⅞	
N. Y. Trap Rock 7% pfd.[36]	10- 6-30	95	.....	1.75 qu. Oct. 1
North Amer. Cem. 1st 6½'s	10- 6-30	57	58	
North Amer. Cem. com.[51]	10- 4-30	1	5	
North Amer. Cem. 7% pfd.[51]	10- 4-30	15	25	
North Amer. Cem. units[29]	9-23-30	24	30	
North Shore Mat. 1st 5's[15]	10- 7-30	95½	.....	
Northwestern States P. C.[37]	10- 6-30	115	.....	$2 Apr. 1
Ohio River Sand com.	10- 6-30	.....	19	
Ohio River Sand 7% pfd.	10- 6-30	.....	97	
Ohio River S. & G. 6's[16]	10- 4-30	92	96	
Oregon P. C. com.[9]	10- 2-30	.....	14	
Oregon P. C. pfd.[9]	10- 2-30	.....	95	
Pacific Coast Aggr. com.[50]	10- 4-30	4	.....	
Pacific Coast Aggregates pfd.	10- 6-30	.....	6½	
Pacific Coast Cement 6's[5]	10- 2-30	75	76¼	
Pacific P. C. com.	10- 2-30	15	18	
Pacific P. C., new pfd.[9]	10- 2-30	65	72	1.62½ qu. Oct. 4
Pacific P. C. 6's[5]	10- 2-30	99¼	.....	
Peerless Cement com.[21]	10- 4-30	7⅞	8¼	
Peerless Cement pfd.[21]	10- 4-30	73	77	1.75 Oct. 1
Penn.-Dixie Cement pfd.	10- 7-30	35	36	
Penn.-Dixie Cement com.	10- 7-30	5	5½	
Penn.-Dixie Cement 6's	10- 6-30	82½	.....	
Penn. Glass Sand Corp. 6's	9- 3-30	102½	.....	
Penn. Glass Sand pfd.	8- 6-30	105	.....	1.75 qu. Oct. 1
Petoskey P. C.	10- 6-30	8½	9½	15c qu. Apr. 1
Port Stockton Cem. units[9]	2-17-30	.....	30	
Port Stockton Cem. com.[5]	10- 2-30	No market		
Riverside Cement com.	10- 2-30	11	.....	
Riverside Cement pfd.[9]	10- 2-30	.....	85	1.50 qu. Aug. 1
Riverside Cement, A[20]	9-18-30	11	14	31¼c qu. Aug. 1
Riverside Cement, B[9]	10- 2-30	2	.....	
Roquemore Gravel 6½'s[17]	10- 4-30	98	100	
Santa Cruz P. C. 1st 6's, 1945[5]	10- 2-30	104½	.....	6% annually
Santa Cruz P. C. com.	10- 2-30	85	.....	$1 qu. Oct. 1
Schumacher Wallboard com.	10- 2-30	7	9	
Schumacher Wallboard pfd.	9-18-30	20	22½	50c qu. Aug. 15
Southwestern P. C. units[44]	9-18-30	240	.....	
Standard Paving & Mat. (Canada) com.	10- 6-30	17	18	50c qu. Aug. 15
Standard Paving & Mat. pfd.	10- 6-30	84	88	1.75 qu. Aug. 15
Superior P. C., A	10- 2-30	33¾	36	27½c mo. Nov. 1
Superior P. C., B	10- 2-30	10	13	25cqu. Sept. 20
Trinity P. C. units[37]	10- 6-30	130	140	
Trinity P. C. com.[37]	10- 6-30	30	.....	
Trinity P. C. pfd.[29]	9-23-30	105	110	
U. S. Gypsum com.	10- 6-30	39⅛	40	40c qu. Sept. 30
U. S. Gypsum pfd.	10- 6-30	119	124	1.75 qu. Sept. 30
Universal G. & L. com.[3]	10- 7-30	No market		
Universal G. & L. pfd.[3]	10- 7-30	No market		
Universal G. & L., V.T. C.[3]	10- 7-30	No market		
Universal G. & L. 1st 6's[3]	10- 7-30	No market		
Warner Co. com.[16]	10- 4-30	36	36¾	50c qu. & 25c ex. Oct. 15
Warner Co. 1st 7% pfd.[16]	10- 4-30	98	101	1.75 qu. Oct. 1
Warner Co. 1st 6's	10- 7-30	98½	.....	
Whitehall Cem. Mfg. com.[38]	10- 6-30	80	.....	
Whitehall Cem. Mfg. pfd.[38]	10- 6-30	50	.....	
Wisconsin L. & C. 1st 6's[15]	10- 7-30	95	.....	
Wolverine P. C. com.	10- 6-30	.....	4½	15c qu. Aug. 15
Yosemite P. C., A com.[9]	10- 2-30	2	3	

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Reading & Co., Youngstown, Ohio. [5]Smith, Camp & Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simon & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [28]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill. [50]Martin Judge Co., San Francisco, Calif. [51]Hemphill, Noyes & Co., New York City.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked	Stock	Price bid	Price asked
Consolidated Cement com. v.t.c., 3220 shs.[1]	1½ per share	.....	Universal Gypsum and Lime, 200 shs.[3]	$2 for the lot	.....
Universal Gypsum and Lime, 300 shs.[3]	$4 for the lot	.....	Holliston Trap Rock Co. com.,[2] 67 shs., per sh.	35	.....

[1]Price at auction by Wise, Hobbs & Arnold, Boston, Dec. 18, 1929. [2]Price at auction by R. L. Day & Co., Boston, July 16, 1930. [3]Price at auction by Adrian H. Muller & Son, New York, August 6, 1930.

Gypsum, Lime and Alabastine, Canada, Ltd., Offers Bonds

AN ADDITIONAL ISSUE of $1,500,000 first (closed) mortgage sinking fund gold bonds, 5½% series A, of Gypsum, Lime and Alabastine, Canada, Ltd., Paris, Ont., is being offered at 95½ and interest by W. C. Pitfield & Co., Montreal. The bonds are dated March 1, 1928; due March 1, 1948. They are a legal investment for life insurance companies under the Insurance Act of Canada.

SINKING FUND—Trust deed provides for an annual cumulative sinking fund, operative from March 1, 1929, for the redemption of first mortgage bonds of a sum equal to 2½% of all bonds issued thereunder up to the respective date of payment, plus interest on bonds previously redeemed. It is estimated that this will be sufficient to retire at par by maturity over 80% of the issue.

CAPITALIZATION—

	Authorized	Outstanding
5½% first (closed) mortgage sinking fund gold bonds, series A	$4,000,000	*$3,869,828
Common (no par), shares	2,000,000	450,876

*Including this issue but after reduction of $130,172 through operation of the sinking fund.

Data from letter of President R. E. Haire, Paris, Ont., September 20.

COMPANY—Formerly Canada Gypsum and Alabastine, Ltd., the company is Canada's largest manufacturer of gypsum and lime products. The business is well established, the company with its predecessors having been in continuous and successful operation since the organization of Alabastine Co., Paris, Ltd., in 1886, and having paid annual dividends continuously for the past 36 years. The company owns extensive gypsum and lime deposits and operates manufacturing plants from coast to coast, strategically located as to both deposits and markets and with excellent transportation facilities. Its plants at Montreal and New Westminster are situated for export trade.

PURPOSE—Since March 1, 1928 the company has expended over $4,400,000 on capital account. Since that date also, the company has caused to be converted into common stock, or has redeemed $1,000,000 of 6% convertible debentures.

The proceeds of this additional issue will be used in part to fund the capital expenditures above mentioned, the balance of over $2,500,000 being provided from the sale of capital stock, from current earnings, etc.

EARNINGS—Earnings after allowing for all operating and maintenance charges available for interest, depreciation and income taxes are shown in the table below.

The average for three years of $1,037,456 per annum is equivalent to over 4.16 times the annual interest requirement on the company's $3,870,000 of first mortgage bonds presently outstanding $600,000 of first mortgage bonds of Standard Lime Co., Ltd. Earnings for 1929 were equivalent to 5.28 times the total bond interest requirement.

Earnings on the same basis for the seven months of the current year ended July 31, 1930 amounted to $400,689. Having in mind depressed business conditions which have existed throughout 1930 to date, but making reasonable allowance for the seasonal variation incidental to the company's business, it is estimated that such earnings, for the full current year ended December 31, 1930 will be in excess of $850,000, equivalent to 3.41 times total bond interest requirement.

Calendar years	Before depreciation, depletion and income taxes	Depreciation and depletion	Dominion income taxes at present rates	Net profits
1927	$819,463	$174,317	$30,971	$614,174
1928	977,591	227,181	39,392	711,017
1929	1,315,315	290,662	61,332	963,320
Seven months ended July 31, 1930	400,689	204,437	3,593	192,658

CONSOLIDATED BALANCE SHEET, JULY 31, 1930 (AFTER PRESENT FINANCING)

ASSETS

Cash	$ 367,921
Marketable securities	99,487
Accounts and bills receivable, less reserves	957,875
Life insurance	16,748
Inventories	796,166
Other assets	195,188
Land and buildings, etc.	9,346,733
Deferred charges, etc.	111,727
Organization expense, etc., written off	298,763
Total	$12,190,604

LIABILITIES

Accounts payable and accrued charges	$ 479,260
Accrued interest on funded debt	69,427
Reserve for Dominion tax	33,419
Funded debt	4,469,828
Reserve for depreciation	668,451
Reserve for depletion	55,065
Capital stock and surplus	6,415,154
Total	$12,190,604

Recent Dividends Announced

American Aggregates pfd. (qu.)	$1.75	Oct. 1
Boston Sand and Gravel com. (qu.)	0.40	Oct. 1
Boston Sand and Gravel pfd. (qu.)	0.87½	Oct. 1
Calaveras Cement pfd. (qu.)	1.75	Oct. 15
Consolidated Oka Sand and Gravel pfd. (qu.)	1¾%	Oct. 1
Dolese and Shepard (qu.)	2.00	Oct. 1
Lawrence Portland Cement (qu.)	1.00	Sept. 30
Medusa Portland Cement (qu.)	1.50	Oct. 1
Newaygo Portland Cement pfd. (qu.)	1¾%	Oct. 1
New York Trap Rock pfd. (qu.)	1.75	Oct. 1
Pacific Portland Cement pfd. (qu.)	1.62½	Oct. 4
Superior Portland Cement Cl. A (mo.)	0.27½	Nov. 1
Wallace Sandstone Quarries, Ltd., pfd.	1.50	Oct. 15

Lehigh Portland Report

THE LEHIGH PORTLAND CEMENT CO. reports for year ended August 31, 1930, net profit of $1,534,477 after depreciation, federal taxes, etc. After deduction of preferred dividends paid, balance was $72,692, equal to 16 cents a share (par $50) on 450,348 shares of common stock, comparing with the 1929 net of $3,676,051 or $4.81.

Blue Ridge Lime and Stone Co. Markets Bonds to the Amount of $400,000

BONDS totaling $400,000 have been issued by the Blue Ridge Lime and Stone Corp., of Ashford, McDowell county, North Carolina, to raise money with which to carry on improvements and the regular quarrying work. The bonds, being first mortgage 10-year 6%, were bought by the Hanover Bank and Trust Co. of New York.—*Greensboro (N. C.) News.*

Tennessee Marble Company Plans Concrete Products Operation

CLARKE, SALOMON & CO., and S. L. Waitzfelder, New York City, recently offered 49,000 shares of capital stock in the Tennessee Marble and Brick Co., Fayetteville, Tenn., at $10 per share.

CAPITALIZATION—

	Authorized	Outstanding
Capital stock (no par value)	100,000 shs.	24,000 shs.

Transfer agent and registrar, Security Transfer and Registrar Co., New York, N. Y.

DIRECTORS—Geo. A. Jarvis, president; James W. Holman, vice-president; Robert W. Gaunt, secretary and treasurer; J. E. Caldwell, E. H. Jones, T. A. Patrick, Fayetteville, Tenn., and C. A. Fleghorn, Petersburg, Tenn.

BUSINESS AND PROPERTIES—The company was organized solely for the purpose of developing one of the largest crystallized limestone (marble) deposits known in America. The company owns 143 acres of marble lands; 40 acres have been gone over thoroughly by two geologists and found to contain more than 6,000,000 cu. yd. of marble. On the 40 acres that have been tested, as above stated, at a very low price of $1 per cu. yd., as estimated by one of the geologists, J. W. Young, has a potential value of over $6,000,000, and as the report covers only 40 acres, all indications are that the 143 acres carry the same formation.

FUTURE DEVELOPMENT—Plan is to immediately install a brick, tile, concrete and artificial stone plant. With the many beautiful, natural colors company can sell its products at very attractive prices.

ESTIMATED EARNINGS—The company has expended in opening and stripping quarry, purchases of machinery, freight and installation of equipment and constructing railroad more than $175,000. The company has 2.7 miles of railroad and other equipment now on hand, and when put into proper condition and brick and tile plant added, should produce, sell and deliver at least $800,000 worth of products the first year, at a low estimate and show $1.25 per share before federal and state taxes are deducted, according to its promoters.

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Sept. 6	Limestone Flux Week ended Sept. 13	Sand, Stone and Gravel Week ended Sept. 6	Sand, Stone and Gravel Week ended Sept. 13
Eastern	2,968	3,397	10,886	12,963
Allegheny	2,764	2,974	7,538	8,440
Pocahontas	530	558	1,532	1,744
Southern	451	506	10,341	10,073
Northwestern	994	911	7,790	8,777
Central Western	465	525	11,802	12,212
Southwestern	493	560	7,169	7,202
Total	8,665	9,431	57,058	61,411

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

District	Limestone Flux 1929 Period to date Sept. 14	Limestone Flux 1930 Period to date Sept. 13	Sand, Stone and Gravel 1929 Period to date Sept. 14	Sand, Stone and Gravel 1930 Period to date Sept. 13
Eastern	123,249	106,535	394,510	291,204
Allegheny	131,513	100,970	254,617	231,427
Pocahontas	13,970	16,905	34,861	44,627
Southern	19,756	23,680	325,693	290,357
Northwestern	40,889	34,541	224,277	195,191
Central Western	18,959	17,260	380,218	359,939
Southwestern	17,724	16,462	241,741	237,484
Total	366,060	316,353	1,855,917	1,650,229

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	1930
Limestone flux	*366,060*	*316,353*
Sand, stone, gravel	*1,855,917*	*1,650,229*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of October 4:

CENTRAL FREIGHT ASSOCIATION DOCKET

26230. To establish on **limestone, agricultural** (not ground or pulverized), in bulk, in open-top cars, **stone, crushed,** in bulk, in open-top cars, and **stone screenings,** in bulk, in open-top cars, in straight or mixed carloads (See Note 3), from Kenneth, Ind., to Buchanan, Mich., rate of $1.07 per net ton. Present rate, $1.17 per net ton.

26238. To establish on **agricultural limestone,** unburned, in open-top cars; **stone, crushed,** in open-top cars, in bulk only, **stone screenings,** in open cars in bulk only, in straight or mixed carloads (See Note 3), from Marble Cliff, Ohio, to Sunbury, Ohio, rate of 60c per net ton. Present rate, 70c per net ton.

26261. To establish on **gravel,** carloads (See Note 3), from East St. Louis, Ill., to Danville, Que., rate of $6.90 per net ton. Present rate, 58c ($11.60 per net ton), sixth class, Official Classification, per C. F. A. L. Tariff No. 260-A, I. C. C. No. 1417.

26269. To establish on **sand and gravel,** carloads (See Note 3), from Connorsville, Ind., to Cincinnati, O., rate of 80c per net ton. Present rate, classification basis, sixth class.

26270. To establish on **soapstone or talc,** ground, crude, in bags, carloads, minimum weight 40,000 lb., from Joliet, Ill., to Akron, O., rate of $1.49 per net ton. Present rate, 19c per M. C. Tariff I. C. C. 5856.

26271. To cancel (a) rate of $3.40 on **sand, viz., blast, engine, foundry, glass, molding or silica,** and (b) rate of $3.11 per net ton on **gravel and sand** (other than blast, engine, foundry, glass, molding or silica), in straight or mixed carloads (See Note 3), from Louisville, Ky., to East Ft. Madison, Ill., thus permitting local rate of $3.41 per ton of 2000 lb. and proportional rate of $2.65 per ton of 2000 lb. to apply in lieu thereof.

26272. To establish on **limestone, agricultural** (not ground or pulverized), in bulk, in open-top cars; **stone, crushed,** in bulk, in open-top cars, and **stone screenings,** in bulk, in open-top cars, in straight or mixed carloads (See Note 3), from Delphos, O.

To	Pres.	Prop.
Dixon, O.	$0.75	$0.70
Monroeville, Ind.	.75	.70
Hadley, Ind.	.88	.85
Arcola, Ind.	.88	.85
Warsaw, Ind.	1.05	1.00
Atwood, Ind.	1.16	1.10
Etna Green, Ind.	1.22	1.15
Bourbon, Ind.	1.27	1.15
Inwood, Ind.	1.32	1.15
Plymouth, Ind.	1.32	1.25

26274. To establish on **sand, viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica,** carloads (See Note 3), from Jones Siding, Penn., to all points shown in N. Y. C. Tariff I. C. C. L. S. 1413, page 113, as amended, same rates as now in effect from James Siding, Penn. (Belmar), per N. Y. C. Tariff I. C. C. L. S. 1413, page 113. Present rates, sixth class.

26276. To establish on **stone, crushed,** in bulk, in open-top cars, and **stone screenings,** in bulk, in open-top cars, in straight or mixed carloads (See Note 3), from Kenneth, Ind., to Bippus, Ind., and Clear Creek, Ind., rate of 90c per net ton. Present rate, 95c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

26277. To establish on **gypsum blocks or tile,** gypsum blocks run of mine, plasterboard, plaster, calcined, etc., from Grand Rapids, Mich., Grandville and Eagle Mills, Mich., to Sault Ste. Marie, Ont., rate of 25½c. Present rate, 22c.

26278. To establish on **crushed stone** and **crushed stone screenings,** etc., carloads (See Note 3), from Delphos, O., to Swanton, O., rate of $1.05 per ton of 2000 lb. Route—Via N. Y. C. & St. L. R. R., Toledo, O., and T. & I. R. R. Present rate, sixth class.

26280. To establish on **crushed stone,** carloads (See Note 3), from West Columbus, O., to Ohio points.

To	Prop.	Pres.	To	Prop.	Pres.
Toledo	90	340	Moline	90	340
Mortimer	90	300	New Winchester	90	300
Findlay	80	110	Martel	80	260
Beagle	80	110	Edison	*80†	85
Arlington	80	110	Mentzer	70	100
Williamstown	80	100	Ridgeway	70	100
Dunkirk	80	100	Horton	70	100
Blanchard	70	100	West Mansf'ld	70	90
Kenton	70	100	Mt. Gilead	70	240
Lunda	70	90	Fulton	70	80
Raymonds	70	80	Peerless	70	80
Peoria	60	70	Rich Hill	70	80
East Liberty	70	240			
St. Marys	70	300			

*C. C. C. & St. L. delivery.
†C. C. C. & St. L. and N. Y. C. delivery.

26285. To establish on **crushed stone,** carloads (See Note 3), from White Sulphur, O., to Quincy, O., rate of 80c per net ton. Present rate, sixth class.

26286. To establish on **broken stone,** carloads (See Note 3), from Bedford, Ind., district to New Haven, Conn., rate of 30c. Present rate, 42c.

26287. To establish on **sand, blast, engine, fire, foundry, glass, molding or silica** (See Note 3), from Rochelle, Ill., to Albany, Brooklyn, Elmira, Syracuse, Utica, N. Y., and other destinations named in Items 11450 to and including 11456 to C. F. A. Lines' Tariff 218G, I. C. C. 2223, rates the same as currently in effect from Oregon, Ill., as named in above mentioned items, said rates to be restricted to apply via C. M. St. P. & P. R. R.-Chicago, Ill.-Delmar, Ill.-Humrick, Ill., and connections, also via Spaulding, Ill.-E. J. & E. Ry. and connections.

26291. To establish on **agricultural limestone,** in box cars, carloads, minimum weight 60,000 lb., from Bedford-Bloomington, Ind., stone district to Charleston and Huntington, W. Va., $2.40 and $2.15 per ton of 2000 lb., respectively. Present rate, $2.70 per ton of 2000 lb.

26293. To establish on (a) **stone, crushed,** in bulk, in open-top cars; **stone screenings,** in bulk, in open-top cars, in straight or mixed carloads, from Kenneth, Ind., to San Pierre, Ind. (b) **Sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) **and gravel** (See Note 3), from Kenneth and Lake Ciecott, Ind., to San Pierre, Ind., rate of 85c per net ton. Present, $1.01 per net ton.

26294. To establish on **dolomite,** roasted or burnt, carloads (See Note 3), from Kenova, W. Va., to points in Ohio and Kokomo, Ind., and Pittsburgh, Penn., rates as shown in exhibit B attached. Present—As shown in exhibit B attached.

EXHIBIT "B"

In cents per ton of 2000 lb.

From Kenova, W. Va.

To—	Miles	Prop. rate	Pres. rate
Alliance, O.	265	169	194
Canton, O.	246	169	194
Cleveland, O.	266	169	194
Kokomo, Ind.	295	248	280
Lima, O.	217	169	250
Lorain, O.	270	169	194
Mansfield, O.	212	144	194
Marion, O.	183	144	194
Youngstown, O.	285	169	194
Pittsburgh, Penn.	284	*	169

*No change.

From Narlo, Ohio

To—	Miles	Pres. rate
Alliance, O.	140	144
Canton, O.	120	129
Cleveland, O.	85	120
Kokomo, Ind.	166	230
Lima, O.	49	144
Lorain, O.	59	105
Mansfield, O.	65	105
Marion, O.	46	144
Youngstown, O.	152	144
Pittsburgh, Penn.	211	169

26314. To establish on **sand and gravel,** straight or mixed carloads (See Note 3), from R. A. Junction, O., to Jackson, O., via Greggs, O., rate of 70c per ton of 2000 lb. Present rate, 75c per ton of 2000 lb.

26315. To establish on **crushed stone,** carloads (See Note 3), from Thrifton, O., to St. Clairsville, O., rate of $1.60 per net ton. Present—$1.70 per net ton.

26316. To establish on **crushed stone,** carloads (See Note 3), from Keeport, Ind. Rates in cents per net ton (to Indiana points):

To	Pres.	Prop.	To	Pres.	Prop.
Marion	85	80	Henry	127	100
Jonesboro	101	85	Blountsville	127	105
Gray	101	85	Losantville	127	105
Fowlerton	101	90	Thornburg	127	105
Janney	101	90	Economy	127	110
Gaston	101	90	Williamsport	127	110
Barker	101	95	Webster	127	110
Muncie	101	95	Richmond	127	110
Medford	117	100	Boston	138	115

Route—Via Wabash Ry., Peru, Ind., and C. & O. Ry.

26332. To establish on **limestone, agricultural** (not ground or pulverized), in bulk, in open-top cars; **stone, crushed,** in bulk, in open-top cars, and **stone screenings,** in bulk, in open-top cars, in straight or mixed carloads (See Note 3), from Woodville, O., to Beech, Mich., rate of $1.02 per ton. Route: P. R. R., Toledo, O., P. M. Ry. Present rate, classification basis.

26383. To establish on **refuse foundry sand,** in bags in box cars or in bulk in box cars (See Note 3), from Allegheny (Pittsburgh North Side), Penn., to Niagara Falls, N. Y., rate of $2.20 per ton of 2000 lb. Route: Via B. & O. R. R., Butler, Penn., B. R. & P. R. R., Buffalo, N. Y., Lehigh Valley R. R. Present rate, 21½.

26313. To establish on **stone, crushed,** coated with oil, tar or asphaltum (known as amiesite, carbo-rock or emescrete), carloads (See Note 3), from West Columbus, O., to points in Michigan,

Indiana, Pennsylvania, New York, West Virginia, and Illinois, rates as illustrated in exhibit D attached. Present—Sixth class rates per C. F. A. L. Tariff 231A, I. C. C. 2044, as illustrated in exhibit D attached.

EXHIBIT "D"

Present and proposed rates to representative points.

From West Columbus, Ohio

To—	Pres. rate	Prop. rate
Addison Jct., Mich.	20	199
Adrian, Mich.	18.5	188
Alida, Ind.	22	234
Argos, Ind.	21	211
Avilla, Ind.	19.5	199
Belle Vernon, Penn.	20.5	199
Bloomfield, Ind.	22	234
Buffalo, N. Y.	23.5	268
Carleton, Mich.	18.5	188
Charleston, W. Va.	19.5	199
Chester, W. Va.	20.5	199
Columbus, Ind.	20.5	199
Covington, Ind.	22	234
Danville, Ill.	22	234
Detroit, Mich.	20	199
Elliston, Ind.	22	234
Evansville, Ind.	24.5	280
Federman, Mich.	18	176
Ft. Wayne, Ind.	18.5	188
Goshen, Ind.	21.5	222
Green Castle, Ind.	21	211
Hamlet, Ind.	21.5	222
Hartford City, Ind.	17	176
Hillsdale, Mich.	20	199
Huntington, W. Va.	18	176
Jacobs Creek, Penn.	20.5	199
Johnstown, Penn.	23.5	259
Kenova, W. Va.	17	176
Kokomo, Ind.	20.5	179
La Otto, Ind.	18.5	188
Lebanon, Ind.	20.5	199
Logansport, Ind.	20.5	199
Manchester, Mich.	19.5	188
Meadville, Penn.	21.5	222
Millersburg, Ind.	20.5	211
Monticello, Ind.	21	211
Muncie, Ind.	17	176
New Haven, Ind.	18.5	188
Noblesville, Ind.	19.5	199
Oil City, Penn.	22	234
Pittsfield Jct., Mich.	18.5	188
Princeton, Ind.	24	268
Richmond, Ind.	16.5	153
St. Joe, Ind.	18.5	188
Sharon, Penn.	20	199
Shenango, Penn.	20	199
Sturgis, Mich.	20.5	211
Templeton, Ind.	21.5	222
Trenton, Mich.	18.5	188
Veedersburg, Ind.	21.5	222
Walkerton, Ind.	21.5	222

26384. To establish on **sand and gravel**, carloads (See Note 3), from Seymour and Terre Haute, Ind.

From Seymour, Ind., to Indiana points

To	Pres.	Prop.	To	Pres.	Prop.
Bedford	88	70	Cortland	69	60
Oolitic	88	75	Seymour	....	....
Shawswick	88	70	Reddington	88	60
Heltonville	85	65	Azalia	88	60
Zelma	85	65	Elizabetht'n	100	60
Norman	85	65	Grammer	100	60
Kurtz	81	60	Alert	100	65
Freetown	81	60	Sardinia	100	65
Suprise	70	60	Westport	101	65

From Terre Haute, Ind., to Indiana points

To	Pres.	Prop.	To	Pres.	Prop.
Bedford	....	....	Cortland	113	110
Oolitic	101	95	Seymour	125	110
Shawswick	101	95	Reddington	125	110
Heltonville	101	100	Azalia	125	110
Zelma	113	100	Elizabetht'n	126	115
Norman	113	100	Grammer	126	115
Kurtz	113	105	Alert	130	115
Freetown	113	105	Sardinia	130	115
Suprise	113	105	Westport	135	120

26385. To establish on **crushed stone**, carloads, loaded in open-top cars (See Note 3), from Rimer, O., to Monroeville, Ind., rate of 80c per net ton. Present rate, 90c per net ton.

26386. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) or **gravel**, carloads (See Note 3).

From Mantua, O., to Ohio points

To	Pres.	Prop.	To	Pres.	Prop.
Cortland	80	75	Leetonia	90	85
Ohlton	80	75	Franklin Sq.	90	85
Austintown	80	75	Long's	90	85
Marquis	90	80	Teegarden	100	90
Calla	90	80	Coleman's	100	90
Greenford	90	80	Lisbon	100	90
Washington-ville	90	85	Braceville	70	65
			Freedom	80	75

From Mahoning and Phalanx, O., to Ohio points

	Prop.
Franklin Square	85
Long's	85

26391. To establish on **crude or raw dolomite and fluxing stone**, in straight or mixed carloads (See Note 3), from Leetonia, O., to Warren and Youngstown, O. Proposed rate (in cents per ton of 2240 lb.), to Warren and Youngstown, O., 92c. Present rate, to Warren, O., 10½c; to Youngstown, O., 11½c.

26393. To establish on **agricultural limestone**, in box cars, carloads, minimum weight 50,000 lb., from Gibsonburg and Woodville, O., to Chester, W. Va., rate of $2.30 per net ton. Present rate, $2.50 per net ton.

TRUNK LINE ASSOCIATION DOCKET

24769. **Lime**, common, hydrated, quick or slacked, carloads, minimum weight 40,000 lb., from Bellefonte and Pleasant Gap, Penn., to Presque Isle, Me., 44½c per 100 lb. Reason—Proposed rate is comparable with rate on like commodities from 60% C. F. A. territory to same point.

24779. **Sand**, N. O. I. B. N. in open cars, carloads (See Note 2), from Bridgeton, N. J., and Vineland to Cape May, N. J., inclusive, to Buckingham Jct., Que., 33½c per 100 lb. Present rate, sixth class. Reason—Proposed rate is the same as present rate in effect to Quebec, Que.

24781. (A) **Lime**, carloads, minimum weight 30,000 lb.; (B) **limestone**, ground, unburned, carloads, minimum weight 50,000 lb., from Jordanville, N. Y., to B. & A. R. R. points (rates in cents per 100 lb.).

To	(A)	(B)
Boston to Dalton, Mass., inclusive	17	16
Pittsfield, Mass., to East Chatham, N. Y., inclusive	16	16
Chatham, N. Y.	15½	15½
Ghent to Hudson Upper, N. Y., inclusive	16	16
Chatham Center to Brookview, N.Y., inclusive	15½	15½

Present rates, sixth class.

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

24783. **Sand**, other than glass, in open-top equipment (See Note 2), from Rochester, N. Y. (rates in cents per 2000 lb.), to Pennsylvania points.

To	Rate	To	Rate
Reynoldsville	150	Lucerne Mines	170
Helevtia Mines	150	Snyder Tipple	170
McIntyre	170	Waterman	170
Kent	170	Luciusboro	170
Aultman	170	Adrian Mines	160
East Olivet	170	Anita	160
Iselin Mine No. 4	170	Yatesboro	170
Iselin	170	Numine	170
Ernest	170		

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

24788. **Crushed stone**, carloads (See Note 2), from Campbell, Penn., to Oxford, Penn., 90c per net ton. Present rate, $1.05 per net ton. Reason—Proposed rate is comparable with rate from Union Stone Co. and Bainbridge, Penn., to Oxford, Penn.

24789. **Crushed stone**, carloads (See Note 2), from LeRoy and Lime Rock, N. Y., to Hickox, Penn., $1.40 per net ton. Present rate, $1.45 per net ton. Reason—Proposed rate is comparable with rate to Brookland, Penn.

24790. **Sand, common or building** (not blast, engine, fire, foundry, glass, molding or silica) **and gravel**, carloads (See Note 2), from Marlboro, N. Y., to West Hurley, Ashokan, Cold Brook, Mt. Pleasant, Phoenicia, Shandaken, Big Indian and Pine Hill, N. Y., $1.25 per net ton. Reason—Proposed rates are comparable with rates from Silver Springs, N. Y., to Dansville and Groveland, N. Y., and from Attica, N. Y., to Olean, N. Y.

24798. **Cement**, carloads, minimum weight 50,000 lb., but not less than 40,000 lb., from (A) Alsen, Glens Falls, Howes Cave and Hudson, N. Y., (B) Binnewater, N. Y. (rates in cents per 100 lb.).

To	(A)	(B)
Winnecook, Me.	22½	23
Unity, Me.	22½	23
Thorndike to Sargents, Me., incl.	24	24½
City Point, Me.	24½	25
Belfast, Me.	24½	25

Reason—Proposed rates are comparable with rates from Hudson and Hudson Upper, N. Y.

24806. **Crushed stone**, carloads (See Note 2), from White Haven, Penn., to Millville, Penn., $1.65 per net ton. Present rate, $2.30 per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24808. **Gravel and sand**, N. O. I. B. N., in open cars, except blast, engine, foundry, glass, molding, quartz, silex and silica, carloads, from Sherburne, N. Y., to points in New York.

To	Prop.	To	Prop.
Woodbridge	150	Delhi	125
Luzon	150	Liberty	140
Fallsburgh	150	Ferndale	140
Hancock	120		

Rates in cents per net ton.

Reason—Proposed rates are comparable with rates from Sherburne, Four Corners, N. Y.

24812. **Crushed stone and common sand**, carloads (See Note 2), from Bethlehem, Penn., to Shainline, Penn., $1.15 per net ton. Reason—Proposed rates are comparable with rates on crushed stone to Bridgeport, Perkiomensville and Norristown, Penn.

24815. **Dolomite, roasted**, carloads, minimum weight 60,000 lb., from Bainbridge, Chickies, Rambo, Swedeland and Union Stone Co., Penn., to Washington, Penn., $1.94 per net ton. Present rate, 16½c per 100 lb. Reason—Proposed rate is comparable with rates on like commodities between points in the same general territory.

24819. **Sand, building and common, and gravel**, carloads (See Note 2), from Lanesboro, Penn., to Susquehanna, Hickory Grove and Great Bend, Penn., 80c per net ton. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

24821. **Sand and gravel**, other than blast, engine, foundry, glass, molding or silica, carloads (See Note 2), from Alfred N. Y., to New York points (rates in cents per net ton).

To	Pres.	Prop.	To	Pres.	Prop.
Coopers	100	90	Bath	110	100
Curtis	100	90	Kanona	110	100
Campbell	100	90	Avoca	110	100
Savona	110	100	Wallace	110	100

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

24827. **Sand and gravel**, carloads (See Note 2), from Pinewald, Quail Run and Toms River, N. J., to Steelton and Middletown, Penn. In open-top equipment, $2.10 per net ton; in box cars or other closed equipment, $2.35 per net ton. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

SOUTHERN FREIGHT ASSOCIATION DOCKET

52128. **Crushed stone, coated with oil, tar or asphalt**, from Snow Flake, W. Va., to Elizabeth City, N. C. Present rate, 44c (Class "A"). Proposed rate on crushed stone, coated with oil, tar or asphaltum (amiesite), carloads (See Note 3), from Snow Flake, W.Va., to Elizabeth City, N. C., 345c per net ton, made on basis of the I. & S. Docket 1885 scale for distance via C. & O. Ry., Norfolk, Va., and N. S. R. R., plus relief line arbitrary of 25c.

52139. **Lime (calcium)**, from Lyle, Tenn., to Mobile, Ala. Present rate, 55c per 100 lb. (sixth class). Proposed rate on lime (calcium), acetate of, dry, in bags or barrels, carload minimum weight 36,000 lb. (applies shipside, for export or coastwise movement), from Lyle, Tenn., to Mobile, Ala., for export or coastwise movement, 24.7c per 100 lb. Same as the present rate to New Orleans, La.

52142. **Stone, crushed or rubble**, from Boxley, Va., to Waverly, Wakefield, Zuni and Windsor, Va. It is proposed to establish the following reduced rates on stone, crushed or rubble, carloads (See Note 3), from Boxley, Va., to Waverly, Va., 120c; to Wakefield, Zuni and Windsor, Va., 130c per net ton, made with relation to rate recently approved from Boxley, Va., to Ivor, Va.

52151. **Lime, unslacked**, from Bangor, Blount Springs, Chepultepec, Flint, Long View and Siluria, Ala., to Mobile, Ala., and Key West, Fla., for export. It is proposed to cancel, on the obsolete theory, the present published commodity rates as published in Agent Speiden's I. C. C. 1386, on lime, unslacked, carloads, minimum weight 30,000 lb., from and to above named points. Domestic rates to apply after cancellation.

52209. **Cement, lime, sand and gravel, fertilizer, concrete and shale products**, between points in southern territory. Application of mileage scales via actual routes on movement of traffic governed by circuity routing clause, where traffic is misrouted through error of carrier. Carriers propose to amend the circuity routing notes in the various tariffs to provide for application of the scale rates for actual distances when shipments move via routes on which the distances exceed those authorized, whether shipments move on direction of shippers or are misrouted by carriers.

52219. **Sand**, from Dixiana, S. C., to Hootentown, N. C. Present rate, 270c per net ton. Proposed rates on sand, carloads, minimum weight 100,000 lb. (when 90% of marked capacity is less than 100,000 lb. such 90% of marked capacity will apply as minimum), except when cars are loaded to their visible capacity the actual weight will govern, from Dixiana, S. C., to Hootentown, N. C., 200c per net ton.

52248. **Crushed marble or marble chips**, carloads (imported), from Gulf and South Atlantic ports to Charlotte, N. C. Eighth class rates now apply. Proposed rates on crushed marble or marble chips, carloads (See Note 3), to Charlotte, N. C., from Gulf and South Atlantic ports (shipside), when imported from foreign countries: From New Orleans, La., and Gulfport, Miss., 316c; Mobile, Ala., and Pensacola, Fla., 282c; Jacksonville, Fla., and Brunswick, Ga., 229c; Savannah, Ga., and Charleston, S. C., 173c per net ton. Made with relation to rates approved under Submittal No. 51113 to Atlanta, Ga., from Gulf ports.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

20823. **Stone, broken or crushed,** in bulk, in gondola or other open cars (See Note 3), from Danbury (Connecticut Agstone Co., Inc., siding), Conn., to Newtown, Conn. Present rate, 85c per net ton; proposed, 70c per net ton. Reason—To meet motor truck competition.

20824. **Stone, broken or crushed,** in bulk, in gondola or other open cars (See Note 3). To Bethel and Redding, Conn., from Branford, Conn. (Pine Orchard Quarry), present $1.05, proposed 70c; East Wallingford, Conn. (Reed's Gap Quarry), present $1.05 and *$1.10, proposed 70c; New Britain, Conn. (Cook's Quarry), present $1.05, proposed 70c. Proposed and present rates in cents per net ton. Reason—To meet motor truck competition.

*Present rate to Redding, Conn.

20844. **Stone, broken or crushed** (See Note 2), from East Wallingford (Reeds Gap Quarry), New Britain (Cooks Quarry) and Branford (Pine Orchard Quarry), Conn., to Danbury, Conn. Present rate, $1 per net ton; proposed, 70c per net ton. Reason—To meet motor truck competition.

20847. **Stone, broken or crushed** (See Note 2), from New Britain (Cooks Quarry), Conn., to Torrington, Conn. Present rate, $1 per net ton; proposed, 70c per net ton. Reason—To meet motor truck competition.

20860. **Sand,** building, common or run of bank (See Note 2), from Avon, Conn., to Wethersfield, Conn. Present rate, 70c per net ton; proposed, 65c per net ton. Reason—To meet motor truck competition.

20887. **Beach sand** (See Note 2), from Old Orchard Beach, Me., to Monson Jct., Me. Present, 32c; proposed, $3.28 per gross ton. Reason—To reestablish a rate which was canceled in error.

ILLINOIS FREIGHT ASSOCIATION DOCKET

4392. **Limestone, ground,** carloads (See Note 2), but not less than 40,000 lb., from Quincy, Ill., to Tamms, Ill. Rates per net ton; present $3.30, proposed $1.80.

5895. **Gravel** (novaculite), carloads, from Olive Branch, Ill., to Tamms, Ill. Rates per net ton. Present, 50c; proposed, Class "E."

I. C. C. Proposed Reports

21268 and 23179. Fuller's Earth Rates. A proposed report in respect of rates on fuller's earth made by Examiner W. R. Brennan in No. 23179, Ohio Valley Refining Co. vs. Seaboard Air Line et al., and an order by the Commission in No. 21268, National Petroleum Association vs. A. C. L. et al., 159 I. C. C. 357, both promulgated on the same day, are closely related. The order as well as the proposed report pertains to rates on fuller's earth.

In the proposed report the examiner said the Commission should find unreasonable the rates on fuller's earth, carloads, from Quincy, Jamieson and Midway, Fla., and Attapulgas, Ga., to St. Marys, W. Va., prior to March 1, 1930, to the extent they exceeded $8.52 a net ton. In that case, the examiner said, the Commission had prescribed a rate of $8.52 a ton which was established on March 1, 1930. Mr. Brennan said the record in this case was not persuasive that the rate prescribed in the case cited was or would be unreasonable for the future, but merely unreasonable prior to the date of the establishment on March 1.

The order issued on the day the Brennan report was given to the public requires the railroads to establish a rate not exceeding $9 a ton from the origin points mentioned to Wellsville, N. Y., not later than December 17. No order was issued in connection with the report in No. 21268 at the time of its promulgation in the latter part of 1929, the decision having been dated November 18. The carriers established a rate of $8.52 to St. Marys. A rate of $9 a ton was prescribed to Wellsville and other points in New York and Pennsylvania but not ordered.

3446. Rates on Plaster Board and Plaster. Recommendation that combination rates on plaster board, in straight carloads or in mixed carloads with plaster, be found applicable and not subject to Agent Jones' tariff I. C. C. U. S. No. 1 and that proposed schedules suspended in I. and S. Nos. 3446 and 3419, be found justified has been made by Examiner John J. Crowley in a proposed report in I. and S. No. 3446, plaster board between points in southern territory, embracing also No. 23155, Certain-teed Products Corp. vs. A. and R. et al., and I. and S. No. 3419, plaster board between points in official classification territory and from that territory to points in Canada. The examiner recommends dismissal of the complaint which assailed rates from complainant's mills in Iowa, Michigan, Ohio, Oklahoma, Texas and Virginia as inapplicable. The National Gypsum Co. of Buffalo, N. Y., and the United States Gypsum Co. of Chicago, Ill., intervened in the complaint case. The examiner said all the proceedings related solely to interpretation of tariffs affecting application of combination rates on plaster board in straight carloads or in mixed carloads with plaster. In the suspension cases respondents proposed tariff changes affecting rates between points in southern territory on plaster board, in straight carloads or in mixed carloads with plaster, and changes in exceptions to official classification ratings affecting like rates applying in official territory.

23168. Gypsum Rates Unreasonable. Examiner W. T. Croft in No. 23168, Blue Diamond Co. of Nevada vs. A. T. & S. F. et al., recommends that the Commission find the rate on gypsum from Arden, Nev., to Monolith, Calif., unreasonable to the extent that it exceeds or may exceed 12 cents per 100 lb., minimum 80,000 lb. The examiner declares the rate to be unduly preferential to producers of gypsum at Midland and Plaster City, Calif., and of intrastate commerce, and unduly prejudicial to complainant and to interstate commerce to the extent that it exceeds or may exceed the rates in effect from Midland and Plaster City.

23157. Sand and Gravel Rates Unreasonable. Examiner William A. Maidens in No. 23157, Smoot Sand and Gravel Corp. vs. B. & O. et al., recommends that the Commission find unreasonable the rates on sand and gravel from Georgetown, D. C., to points in Maryland, Pennsylvania, Virginia and West Virginia, to the extent that they exceed or may exceed rates set forth in table for single-line hauls, subject to the addition of 20 cents to be added for joint-line hauls. Scale begins with 65 cents for 20 miles and under and runs out with 200 cents for 350 miles and over 320 miles.

I. C. C. Decisions

20821. Cement. Oklahoma Portland Cement Co. vs. Santa Fe et al; No. 21164, Iola Cement Mills Traffic Association et al vs. A. and S. et al, and No. 21958, Oklahoma Portland Cement Co. vs. Santa Fe et al, the Interstate Commerce Commission has ordered a revision of the rates on portland cement from points in Oklahoma and Texas to southwestern Texas, to be made not later than July 15, based on a finding of unreasonableness and undue prejudice. The findings were made in a report written by Chairman McManamy, speaking for division 2. Reparation was also awarded. The revision is based very largely upon criteria taken from Iola Cement Mills Traffic Association vs. A. W., 87 I. C. C. 451; Western Cement Rates, 48 I. C. C. 201, 52 I. C. C. 225; Oklahoma Portland Cement Co. vs. D. and R. G. W., 128 I. C. C. 63, and Iola Cement Mills Traffic Association vs. A. and V., 144 I. C. C. 585, 148 I. C. C. 122. The Oklahoma Portland Cement Co. case, 128 I. C. C. 63, was referred to in this report as the Texas case.

The commission found that the rates from Ada and Dewey, Okla., and Chanute and Humboldt, Kan., to destinations in Texas on the lines of the defendants west of the line drawn through Big Spring, San Angelo and Del Rio, Tex.; also from Chanute, Humboldt and Dewey to destinations on the Rio Grande railway and the Rio Grande, Micolithic and Northern railway, and from Ada to destinations on the Texas-New Mexico railway were and for the future would be unreasonable and unduly prejudicial to the extent that they exceeded or might exceed scale IV rates as set forth on page 87 in appendix A to the report in the Texas case, applied as provided in appendix B in that report, subject to the condition that the rates from Chanute, Humboldt and Dewey should be calculated on the distances from Chanute.

At one of the findings the commission said that the Texas commission had officially advised the federal body that it had reached the conclusion that the existing intrastate basis of rates was proper and should be continued. This report said that the establishment of the rates herein found reasonable on interstate traffic would remove the alleged unjust discrimination against interstate commerce.

The commission found that the complainant in No. 20821 had made shipments at the rates condemned and was entitled to reparation on shipments made on and after December 12, 1927.

Illinois Gravel Company Appeals I. C. C. Decision

THE Coogan Gravel Co., Chillicothe, Ill., has appealed to the circuit court of Peoria county, Ill., the decision of the Illinois Commerce Commission on rates charged by the Rock Island for switching gravel to the Santa Fe at Chillicothe.

The Commission in its decision on June 30, held that the rate of $3.50 per car plus the line haul of the Santa Fe to points on line from Chillicothe, was not unjust and later denied a rehearing of the case.

West Coast Lime Project Would Make Dry Ice

BAYLIES C. CLARK, president R. L. Hollingsworth, and J. E. Anderson, directors of the California Lime Products Co., Ltd., which proposes to engage in the manufacture of solid carbon dioxide, commonly known as "dry ice," were present at a recent meeting of the North Sacramento, Calif., Chamber of Commerce, and outlined their plan and asked for co-operation of the local organization to locate a manufacturing plant here.

According to the officers of the company, many bids are being made to secure the plant, which would give employment to about 75 men the year round, for other cities, but owing to favorable freight rates and proximity to the lime quarry in Placer county, on which the company now holds options, this section is desirable as a location.

The company is now engaged in financing the purchase of quarry properties, which, when acquired, according to Mr. Hollingsworth, will assure the financing of burning plant by debenture bonds available through two banking institutions.

The chamber's aid in the disposition of sufficient capital stock to raise $75,000 for quarry purchase would enable the firm to locate the burning plant in this section, thus enabling some 75 families to locate here, members were told.

Officers and directors of the company other than those already mentioned include R. E. Mittlestaedt, W. E. Kleinsorge, G. T. Gunston, Harry A. Armstrong, Cyril Maurer, Chas. Lumbard and Chas. L. Gilmore, all of Sacramento.—*North Sacramento* (Calif.) *Tribune.*

Paul C. Van Zandt with Universal Atlas Cement Co.

APPOINTMENT of Paul C. Van Zandt as an additional assistant to president, Universal Atlas Cement Co., a subsidiary of United States Steel Corp., was recently announced by B. F. Affleck, president of the company. Mr. Van Zandt has been assigned to duties in connection with operation and engineering. A. C. Wilby, for several years assistant to president, continues in that position.

Mr. Van Zandt is the inventor of the Compeb double-grinding cement mill, known for its simplicity and economy. This machine pulverizes at one operation either raw material or cement clinker from one-inch size to impalpable powder. He has had thirty years' engineering, design and operation experience in the cement manufacturing field in the United States, Canada, Mexico, Cuba and the Orient.

For five years Mr. Van Zandt was chief engineer for the Asano Portland Cement Co. at Tokyo, Japan. He built and started operation of five cement plants in Japan, designed, erected and started in operation five waste-heat power plants and changed cement shipment in the Japanese empire from wooden barrels to sacks. He organized and trained a corps of Japanese engineers to operate American cement machinery. At that time Mr. Van Zandt was the only American cement plant engineer in the Orient, and his duties involved work with every large plant in Japan and China.

Prior to his experience in Japan he was connected for eighteen years with the Allis-Chalmers Manufacturing Co., designing and remodeling cement plants, correcting

Paul C. Van Zandt

difficulties in operations and increasing their efficiency. During this period he visited leading cement producing companies throughout the world. For the last six years he has been with the Ideal Cement Co., Denver, Colo., during which time he built two new plants and remodeled two others.

Mr. Van Zandt is the author of a number of technical papers on the cement industry in the Orient. He is a graduate in mechanical engineering from Purdue university and is a member of the American Society of Mechanical Engineers.

Reopen British Columbia Gypsum Deposits

ANNOUNCEMENT was made in Halifax, N. S., recently that the gypsum deposits at Island Point, B. C., which were the subject of much legislation some years ago, are to be reopened and developed by the Gypsum Lime and Alabastine Products of Canada, Ltd., with headquarters at Montreal. Expectations are that shipments will be under way by next May, while preparations are now going ahead in the installation of machinery, etc.—*New York* (City) *Journal of Commerce.*

Ninth Annual Asphalt Paving Meet in December

THE NINTH ANNUAL Asphalt Paving Conference will be held at the Hotel Peabody, Memphis, Tenn., December 1 to 5, under the auspices of the Asphalt Institute, J. E. Pennybacker, managing director, and the Association of Asphalt Paving Technologists, C. A. Mullen, secretary.

Among the speakers expected to discuss the matter of improving farm-to-market roads are: Sam H. Thompson of Chicago, president of the American Farm Bureau Federation; Ernest H. Smith, executive vice-president of the American Automobile Association, Washington, D. C., and R. H. Aishton, New York and Washington, chairman, American Association of Railway Executives, and president, American Railway Association. Mr. Aishton's particular subject will be "Co-ordinating Rail, Water and Highway Transport."

The program for this year's conference has been altered somewhat radically, the various technical subjects to be considered being laid before the conference in the form of reports by technical committees appointed to make the necessary surveys. Discussion of the reports will follow, orally and in written form.

Other speakers will be Leroy M. Law, president, the Asphalt Institute; Prevost Hubbard, president, Association of Asphalt Paving Technologists; Mayor Watkins Overton and City Engineer W. B. Fowler of Memphis; R. H. Baker, state highway commissioner of Tennessee; Horner P. Keith, chief maintenance engineer of Alberta Province, Canada, who will discuss Canada's Experience in Solving Local Road Problems; J. J. Forrer, state maintenance engineer of Virginia, who will speak on The Development of a State Highway System; E. F. Kelly, chief of research, U. S. Bureau of Public Roads, Washington, D. C., whose subject will be Simplified Specifications for Asphaltic Materials; Roy W. Green, president, Western Paving Laboratories, Lincoln, Neb., who will discuss Economic Thickness of Foundation and Wearing Course; J. T. Pauls, senior highway engineer, U. S. Bureau of Public Roads, Washington, D. C., who will talk on The Mixed-in-Place Method; H. C. Weathers, testing engineer of the Florida Road Department; H. J. Spelman, chief engineer of the West Virginia Road Commission; C. S. Mullen of Montreal, Quebec, Canada, and Clarence D. Pollock, a consulting engineer of New York, all of whom will discuss the use of asphaltic materials for "mat" or "carpet" coats, mixed-in-place construction, cold-mix road types, and joint and crack fillers, respectively. W. E. Hawkins, construction engineer of the North Carolina Highway Department, and R. W. Coburn, construction engineer for the Massachusetts Department of Public Works, are expected to discuss sand-asphalt pavement construction.

Foreign Abstracts and Patent Review

Observations on American Cement Plants. Under the title "Ueber neuzeitliche Nabverfahrenfabriken in den Vereinigten Staaten von Amerika," Director H. Engel, of the Vereins Deutscher Portland-Cement-Fabrikanten, has published a 37-p. address on his visits to American cement plants in 1929. Some extracts of particular interest to American readers are: "Such shortcomings as have been often reported on certainly exist in America even today, especially in the older plants; the outside appearance of the plants is often not very pleasing, partly due to the waste in coal so frequently practiced. However, efforts are being made to eliminate this; and an activity which was frequently wholly neglected is today very much considered, namely, the prevention of accidents. Examples of this are found in every one of the American technical periodicals. The prevention of accidents—fatal ones and those which mean only a loss in working time, the American names them 'lost-time accidents'—has become a question of honor and of sportsmanlike contests between the companies and the various plants.

"Upon entering the plants the visitor is usually greeted with the warning directed to all employes of the plant: 'Let us co-operate to make this a no-accident month.' [The following is interesting as Herr Engel's understanding of the P. C. A. safety contests.] The Portland Cement Association confers certificates which advertise the reputation of those plants that have operated for one or two years without accidents; after three years marble monuments are given, the pictures of the plant managers appear in the technical periodicals, etc.

"A purely material conception of the importance of the cement industry in the States is given by the figure of 175,000,000 bbl. of portland cement which was produced over there in 1928 in 161 plants. For a population of 120,000,000 inhabitants this means 1½ bbl. per capita. This consumption, which exceeds the German so much, is explained by advertising, which has opened new fields for the use of portland cement. Best known is the example of the concrete roads: For we regard with envy how over there every automobile driver praises the concrete roads as being the best, an opinion which is not yet shared fully by our road-building authorities. Furthermore, the American is not known to be hesitant in tearing down everything when new construction promises him any kind of financial advantage; however, the increase in population brings in itself the necessity for more construction.

"The leading men of the industry are inclined one and all to keep the importation of European cement from their necks. After the war a certain quantity of foreign cement came to the Southern ports of the Union. Almost nothing but Belgian cement was concerned. It did not carry a duty of 19 c. per bbl. such as carried by German cement; it was mostly brought across as ballast. It was quite exasperating when about a year ago a Belgian training ship carried cement as ballast in order to discharge this portland cement, which was charged with little freight, in a Gulf port, in a port, however, in which an American cement plant had just been placed in service. Therefore various plants have been established in the South in order to prevent such importation, but naturally also in the old cement-producing districts.

"The annual reports of the Bureau of Mines show that during the last four years 26 new cement plants were built in the States, of which 24 are wet-process plants. The most interesting ones of the more recently built wet-process plants that were visited are listed in Table I with various data." [Herr Engel reports on certain typical characteristics of American cement plants. He discusses the methods and equipment used for loading bulk cement into freight cars and ships; also the standard bin and sacking plant found in every new cement plant, and he describes the method of slurry storage and the use of the individual drive. He said: "Today there actually are American plants which pride themselves that they have not a single belt running in their entire plant."]

Then the author describes briefly the Clinchfield, Ga., plant in which he finds a peculiarity not seen by him in the other plants, in that the hot clinker is cooled as in old American rotary kiln plants by elevating it, dropping it over a wall, sprinkling it with water and hoisting it with a crane. Writing about the Southwestern plant at Osborn, Ohio, he refers to the changes made there in recent years. He says: "The former very beautiful and easily visible ground plan of the mill has suffered from the addition of a specially large mill in the mill building, and the addition of another mill at the charging end of the raw mills." It impresses him that the plant has not used any electricity from the outside since its erection.

Next the author describes the raw material handling system of the Great Lakes plant near Buffalo. Then the track system in the quarry of the Trinity plant near Fort Worth, Tex., is described, where the water need for the plant is stored in a special lake, for the country is almost without water, he says! "A sister plant of the Trinity is located at Houston; it is one of the most interesting and newest plants and has also the longest rotary kiln of all the plants. Another interesting feature is the fact that the lime material consists of oyster shells."

Handling equipment of the International Cement Corp. plant in Houston is also described briefly, including also the plants at New Orleans and Norfolk. "In the New Orleans plant the arrangement of the mill has been made comparatively economical in contrast to many installations which the author has seen elsewhere in America," he says. "The tracks have been distributed over the plant site on an absolutely astoundingly large scale. Noteworthy of the packing plant

TABLE I—RECENTLY BUILT WET-PROCESS CEMENT PLANTS IN THE UNITED STATES

Year built	Name of plant	Kilns No.	Dimensions long meters	Dimensions diam. meters	Output in barrels daily	Shipped in bulk	Waste-heat boiler	Filter
1925.	Clinchfield Portland Cement Co.	3	53.4	3.4	3300	?	yes	no
1925.	Southwestern, Osborn	4	53.4	3.6	5000	yes	yes	no
1927.	Great Lakes, Buffalo	4	76.3	3.4	7000	yes	no	no[1]
1926.	Lehigh, Sandts Eddy	2	48.8	3.4	2500	?	yes	no
1925.	Trinity Portland Cement Co., Fort Worth	2	73.2	3.4	3200	no	no	no[2]
1927.	Trinity Portland Cement Co., Houston	1	91.5	3.45	1700	no	no	no
?	Lone Star, Houston	3	67.1	2.7	3300	no	no	no[3]
1927.	Louisiana, New Orleans	2	67.1	2.7	2200	no	no	no[4]
1925.	Virginia, Norfolk	3	66.8	2.7	3300	yes	no	no
1927.	Florida, Tampa	3	53.4	3.4	4500	no	yes	no
1928.	Keystone, Bath, Penn.	4	76.3	4.0	7000	?	no	no[5]
1927.	Valley Forge, Conshohoken	2	68.0	3.4	2800	yes	no	no
1924.	Manitowoc Portland Cement Co.	3	48.8	3.05	3750	yes[7]	yes	yes
1924.	Ford Motor Co., Detroit	2	45.8	3.05	2000 (?)	yes	yes	yes[6]

[1]Very cheap electric current.
[2]Oil firing.
[3]Changed to oil in March.
[4]Preparing for change to oil.
[5]Kilns 3 and 4 in operation on April 29.
[6]Blast furnace slag for raw material.
[7]Company-owned cement transportation steamboat.

TABLE II—OPERATING DATA ON THREE TYPES OF WET-PROCESS CEMENT PLANTS

Per barrel	——Kiln without waste-heat boilers—— 1 Kiln plant with separate power plant	2 Kiln plant with power purchased from outside	3 Kiln plant with waste-heat boilers, turbo-generator and all improvements
I. Kiln coal.	43 kg.	43 kg.	
II. Power coal; or equivalent in money.	9 kg.	....	47½ kg.
	....	19 kg.	
Total	55 kg.[1]	62 kg.[2]	47 kg.[3]

Remarks: [1]Great safety; power plant can be equipped in a most modern way by itself; safety in the matter of interruptions in connection to outside source of power.
[2]Lowest installation costs; elimination of operating force; current supply can be increased in night hours [lower current tariff at night in Germany].
[3]Most expensive plant; no full safety; power generation dependent upon the kiln plant; lowest coal consumption per barrel.

is the fact that the bags of cement can be delivered not only to the freight cars, but also to the opposite side into trucks."

One of the "grandest" plants that the author has seen, he says, is that of the Florida Portland Cement Co., at Tampa, of which he describes the material-handling equipment. The most photographed object is the unique car dumper, which the author describes. "The ground plan of the plant and also rail transportation is laid out with great care. On the other hand, the loading facilities for transportation on water were entirely neglected."

Of the cement plant at Valley Forge, near Philadelphia, the author states that it is "owned by the Fuller concern and therefore has been made a genuine exhibit of the manifold applicability of Fuller conveying system. The kilns, mills, bins, sacking plant and coal mill are located as separate units and, furthermore, they are located also at quite different levels. The clinker passes from the kilns over shaking conveyors. When these are found in America, it can be assumed that there are connections of some kind with European machine factories; the Americans use them but rarely. The cleanliness of the plant is striking. There is also a peculiarity which was provided last winter; the Americans, like ourselves, suffer because clinker comes hot from the mill into the bins, especially in the warm annual seasons. Therefore the attempt has been made at Valley Forge to embed the cement pipe line in a special cooling tube through which cold water is passed, so that the cement will be cooled by it."

Features of the Keystone cement plant at Bath, Penn., are also described; then the Manitowoc cement plant. Of the Manitowoc plant Herr Engel writes: "At each kiln there is a slurry filter and the author has found filters only in this plant and at the Ford plant at Detroit, which is the latest that can now be seen in the American cement plants." The drum filter used at Manitowoc and the disc filter used at the Ford Detroit plant are then described in detail. The disadvantage of the filter in Detroit might be the continual contact of the filter cloth with the scrapers, and of the filter at Manitowoc the comparatively small size of the units, he concludes.

"The problem of the use of filters," states Herr Engel, "is closely connected with the use of waste-heat boilers back of the kiln. When the heat balance of a kiln operating by the wet process is considered, the enormous consumption of heat for evaporating the water in the slurry is astounding. If it were possible, as the firms supplying the filter equipment assure us, to remove one-half of the water from the normal kiln slurry, a rather high demand for calories and a detriment of the waste-heat boiler plant could be avoided." The author cannot determine whether the data given him concerning coal consumption with and without filters, with and without waste-heat boilers for the long or the short kiln are correct or not. But he has picked out figures which appear to him in some degree believable, relative to the coal and power consumption of the plants. These figures are given in Table II for the three most customary types of wet-process cement plants.

When the cement plants which the author has discussed are classified in Columns 1, 2 and 3 of the table, it is striking that seven plants have waste-heat boilers and seven have no waste-heat boilers, but purchase their electricity; and that none come under column 1 (with separate power plants). This causes wonder when the coal consumption figures added up in the three columns are compared and it is found that the one for column 2 is by far the highest. The explanation that so many new plants obtain electricity from outside central stations in spite of this is this: That the capital investment is considerably lower in cement plants for which the electricity is purchased from an outside source. But, says Herr Engel, if they must save capital, they will rather deny themselves the somewhat cheaper power plant operating independent of the kiln and depend upon outside electricity.

In referring to the Ford cement plant, Herr Engel states that protective equipment has been provided in the plant on a huge scale, and that cleanliness is adhered to with such care as is possible perhaps only with Ford. "He wanted to prove to us cement producers that our kind of plants can be kept representatively clean and free of danger."

Kursachsen Cement Plant. The first section of the portland cement plant of the Kursachsen Corp. at Carsdorf, a. U., in Germany, was placed in service in 1928 and an extension in 1929, which brings the capacity of the plant to 500 tons of cement per day by the wet process. The plant was designed by F. L. Smidth & Co.—*Zement* (1930) **19,** 20, pp. 464-467.

Mix of Alumina Cement and Basic Furnace Slag. W. Petry presents the results of experiments with mixtures of alumina cement and ground granulated basic blast furnace slag. The Alca fused cement showed 0.42% loss on ignition, 1.05% insoluble residue, 4.99% silicic acid, 15.85% iron oxide (which is very high), 38.70% aluminum oxide, 2.08% titanic dioxide, 36.65% calcium oxide, 0.10% sulphuric acid (SO_3), and the residue was 0.2% on the 900-mesh per sq. cm. screen and 7.1% on the 4900-mesh screen. The ground blast furnace slag showed 0.75% loss on ignition, 0.47% insolubles (non-disintegrated residue), 29.41% pure silicic acid, 18.20% sesqui-oxide (iron oxide and alumina), 44.42% calcium oxide, 4.79% magnesium oxide, 0.18% sulphuric acid (SO_3), 1.16% sulphide of sulphur, and the residue was 1.1% on the 900-mesh screen and 9.4% on the 4900-mesh screen.

The results of the tests made with a number of specimens of different compositions may be summarized as follows: The tensile strength of the standard mortar after 28 days did not decrease much, when the alumina cement was replaced to one-half with blast furnace slag. The compressive strength of the standard mortars still exceeded considerably the requirements for strength of the high-grade portland cements, when the alumina cement was replaced to one-half with blast furnace slag. The cube strength of a mortar of 333 kg. cement to 1000 liters of sand plus gravel, and with the water-cement factor $\sim$ 0.5, dropped from 503 kg. per sq. cm. to 420 kg. per sq. cm. when one-fourth of the alumina cement was replaced with slag, and to 262 kg. per sq. cm. when one-half of the alumina cement was replaced with slag. However, for construction requirements it is inadmissible to replace three-fourths of the cement with slag.

In reference to the action of 5% magnesium sulphate solution, 5% sodium sulphate solution, 1% sulphuric acid solution and 10% acetic acid solution, the outward appearance and also the tensile strength specimens after 15 months of storage showed that a replacement of one-half the alumina cement with blast-furnace slag acts favorably. In this instance, the tensile strength was greater than after 28 days combined storage. An exception was observed, however, in the case of 5% ammonium sulphate solution, in which two specimens showed considerable decrease in tensile strength.—*Zement* (1930) **19,** 29, pp. 674-678.

Accident Prevention in Cement Mills and Quarries

Turnout of Operating Men at National Safety Congress at Pittsburgh, Penn., the Best Ever

AS USUAL the program of the annual National Safety Congress, this year at Pittsburgh, Penn., September 29 to October 3, was replete with interesting and valuable papers to every one interested in accident prevention. As there were 24 or more sessions in progress at one time, it is obvious that to attend and report all was out of the question, although all would have been interesting. We will have to confine this report to the cement and quarry section meetings.

Cement Section Enjoys Profitable Sessions

The meetings of the cement section at the National Safety Congress were noticeably better attended than for the last two or three years and the program proved one of the most profitable to which the members of the section have ever listened.

General Chairman Edward H. Parry opened the first session with the annual address or report, stressing particularly the progress made recently in the reduction of fatal accidents in the cement mills and quarries and the high hopes entertained for a sizable decline in general severity of the accidents reported during 1930.

Mr. Parry read a memorandum prepared from the records of the Portland Cement Association indicating that during the first eight months of 1930 there were 389 lost-time and 15 fatal accidents in the 150 plants reporting as against 444 lost-time and 31 fatal accidents during the corresponding months of 1929 by the 138 plants reporting during that period. The reduction in lost-time accidents amounted to 12% and in fatal accidents to 51%, Mr. Parry stated. He continued to predict that still greater reductions would surely follow faithful continuance of present intelligent co-operative efforts.

That considerable improvement in accident severity also may be expected in the annual report for 1930 was shown when Mr. Parry estimated that days lost through accidents or assessed against plants as penalties for permanent disabilities and fatalities totaled nearly 100,000 less than for the corresponding period last year. As the days actually lost or assessed against plants for deaths and disabilities in the 1929 rating totaled about 318,000, it will be noted that prospects for a sizable reduction in this year's severity figures are very good.

Reporting and Investigating Accidents

Following Mr. Parry's report, P. L. G. Hasskarl, safety engineer of the Pennsylvania Light and Power Co., Allentown, Penn., read an interesting paper on "Methods of Investigating Accidents." Mr. Hasskarl recommended a searching investigation and study of every accident and near accident irrespective of whether the consequences chanced to be light or severe. He laid down a number of fundamental factors to be covered by investigators and urged thoroughness both in collecting and interpreting accident information. He described two methods of investigating accidents, in detail, as follows:

"There are many methods of investigating accidents, all of which may produce the desired results; however, it is the intent in this paper to discuss two methods that have proven their effectiveness as the companies using them have excellent accident records.

"*(a)* Safety committee composed of various department heads with the safety director or engineer as chairman. This committee should be limited to a maximum of seven members.

"A committee composed of department heads has many advantages, not only from an accident prevention viewpoint, but from an operating and production viewpoint as well. It is during the investigation of accidents that inefficient methods, non-observance of rules and regulations by workmen, ineffective guarding of machinery, use of defective or incorrect tools and improper planning of work may be observed by the department heads.

"Furthermore, it indicates to the workmen that the department heads, by actually participating in an investigation, are squarely in back of accident prevention.

"*(b)* Appointive workmen's committee, composed of workmen of equal rank and performing the same duties as the injured person, the chairman of which is the safety director or engineer. This committee should be limited to a maximum of five members.

"A committee composed of workmen is educational to the members making the investigation. They disclose many unsafe practices which have existed for a long time that they themselves may have followed, not realizing the hazards involved while doing so and which were not observed by the supervisory heads. The necessity for observing the company's rules and regulations. Furthermore, they usually become accident prevention leaders in their own sphere, which is of great value to their organization.

"Immediately upon receiving a report of a fatal or serious accident, whether it be an actual or near one, the safety committee members should be notified and requested to go to the scene of the accident at once; or if it is a workmen's committee the members should be appointed without delay and instructed to hold themselves in readiness, so that when the chairman arrives they can go to the scene of the accident at once to investigate.

"Investigation of a fatal or serious accident, to be effective, should be made the same day on which the accident occurs, regardless of place or time of day.

"Upon receiving a report of an accident, the chairman should issue instructions not to disturb the physical evidence at the place where the accident occurred, unless it is imperative to do so. All workmen (including the supervisory head) who are uninjured should be kept available at the scene of the accident, so they can be interviewed by members of the committee.

"Pictures should be taken of the machinery, structure or tools, involved in the accident; if this cannot be done, a pencil sketch on which the various details are shown should be made. These are valuable for use in the committee's deliberations and for educational purposes.

"The committee, upon its arrival at the scene of the accident, should thoroughly go over the ground, to acquaint themselves with all the physical details; after which all witnesses and others in any way involved or having facts pertaining to the accident should be interviewed individually, and written notes made of the questions and answers. The injured workman, if his condition is such that it can be done, also should be interviewed.

"A strenuous effort should be made to find the basic cause for the accident, as experience has taught us that a workman may violate a rule, disregard his superior's order or orders, use incorrect tools or take a chance. Among the many basic questions to assist in the investigation are the following:

"1. Did his superior, through lack of discipline or not enforcing the company's or his own orders, permit the workman to acquire bad habits?

"2. Was the work properly planned?

"3. Was it properly supervised?

"4. Were the correct materials used?

"5. Was the workman experienced or inexperienced?

"6. Was someone lax in not providing suitable guards?

"7. Was proper precaution taken and the workmen cautioned before the work was started?

"8. Was the equipment properly designed and arranged for safe operation and maintenance?

"The investigation of accidents loses much of its effectiveness if the basic cause is not found.

"Following the completion of the investigation, the committee members should review all the facts in the case, reach a conclusion as to the cause and responsibility for the accident and make recommendations for preventing a recurrence or disciplinary measures to be taken.

"The chairman of the committee should write a concise report of the accident, incorporating the committee's findings, which report should be signed by the committee members, after which the report should be submitted to the management for approval.

"A minority report may be written if one-third of the committee members do not concur in the conclusion reached, responsibility for the accident or recommendation made by the two-third majority.

"It is the responsibility of the committee chairman to see that the recommendations, if approved by the management, are put into effect."

Be Not Content With Present Achievements!

Thomas F. Quigley, chief of the mines and quarries section of the Pennsylvania Department of Labor and Industry, followed Mr. Hasskarl with an address in which he paid high compliment to the safety work of the cement mills and to the Portland Cement Association, declaring that this industry led all others in the reduction of accidents and in the progressive methods employed.

After stating that in such an audience as the cement section he could hardly be expected to leave suggestions which might offer improvement, he proceeded to stress the value of enthusiasm as an aid to safety progress. Mr. Quigley's own enthusiasm proved contagious, well demonstrating the point of his remarks. He made his listeners see in the accident-free future a much greater and more successful cement industry than in the past and left the cement men with the comfortable feeling that they had not chosen unwisely in joining the cement industry as a life occupation.

Mr. Quigley recommended strongly that the Portland Cement Association in its annual trophy contest give due consideration to fatalities arising from strokes of lightning, where there was no contributory negligence on the part of the employer, any employe or the victim. Mr. Quigley considered it unduly severe and harmful to discipline or penalize a plant organization for an accident over which no control was humanly possible.

Citing the magnificent records of the three quarries in the cement industry which had operated over five years without a lost-time accident, Mr. Quigley recommended that appropriate recognition should be made in some way. Quarries referred to were those of the Cowell Portland Cement Co., at Cowell, Calif.; Lehigh Portland Cement Co., at Iola, Kan., and the Pennsylvania-Dixie Cement Corp., Dexter Quarry, Nazareth, Penn. Following Mr. Quigley's address the matter was placed in the hands of a committee to consist of R. B. Fortuin, incoming chairman of the cement section; W. L. White, Jr., incoming vice-chairman, Mr. Quigley and two additional members to be selected later.

The closing feature of Tuesday afternoon's program was a skit entitled "Converting the Hard-Boiled Foreman," by J. A. Voss, safety director of the Republic Steel Corp., and M. P. "Mike" Grady, foreman, Pennsylvania railroad shops, Canton, Ohio. This feature of the program was not only very entertaining but it carried home the safety message most effectively.

New Officers of Cement Section

During the afternoon session the annual election of officers took place, resulting in a unanimous vote for the entire slate recommended by the nominating committee. Following are the new officers:

Chairman, R. B. Fortuin, assistant to general manager, Pennsylvania-Dixie Cement Corp., Nazareth, Penn., who served during the past year as vice-chairman.

Vice-chairman, W. L. White, Jr., general superintendent, Medusa Portland Cement Co., Cleveland, Ohio.

Secretary, A. J. R. Curtis, assistant to general manager, Portland Cement Association, Chicago.

Col. H. A. Reninger was appointed chairman of the membership committee; David Adam of the Lawrence Portland Cement Co., chairman of the poster committee; S. H. Harrison, Vulcanite Portland Cement Co., chairman of the engineering committee; A. J. R. Curtis, chairman of the publicity committee, and Jack Dempster of the Canada Cement Co., editor of the Cement Section News Letter.

The Foreman and His Men

The Wednesday morning session opened with R. B. Fortuin's paper on "What Kind of a Talk Should a Foreman Give to His Men?" From the number of questions raised, Mr. Fortuin evidently intended the paper to provoke discussion, on a subject which quite obviously is one of many angles. David Adam, safety director of the Lawrence Portland Cement Co., suggested that in talking to their men the foreman take full recognition of the human values, shaping his appeal to the individual reactions of each man rather than to the group.

A. N. Couchman, safety director of the North American Cement Corp., offered criticism for the foreman who does not set a good example. Mr. Couchman felt that the foreman who says, "Do as I tell you, not as I do," could hardly succeed in instilling safety habits. He also argued for the general discouragement of alibis by foremen or workmen as absolutely worthless in the accident prevention movement. His prescription for success in safety work was summed up in the words: Organize, supervise, deputize and recognize.

A. J. Eales, safety director of the Bessemer Limestone and Cement Co., felt that the foreman often made progress with the men by discussing the company's general policies with them, explaining the principles involved. He found from a long experience that the "hard-boiled" foreman can't get the safety message over to the men and for that reason his usefulness in industry has disappeared. Mr. Eales felt that more care should be taken by foremen to acquaint their men with the cost of specific accidents, as few could comprehend, by themselves, the terrible cost of injuries and the great expense of those mishaps which happen to injure only the plant, equipment or tools.

Chairman Parry recalled a department safety meeting once visited where the foreman supplemented an explanation of various accidents on a current list with caustic ridicule for a man present who was to blame for an accident. While Mr. Parry did not recommend this method as one that was capable of safe application generally, he suspected that the principle involved might be successfully employed in some cases.

F. H. Sass, employment manager of the Universal Atlas Cement Co. at Buffington, Ind., said that from his observation the traditional "hard-boiled" foreman was gone and that it was a good thing. W. M. Powell, safety director of the Medusa Portland Cement Co. stated that he was against anything that savored of the "hard-boiled" idea and that he believed in and practiced man-to-man conversations as the best method for the foreman to use in the shop. It was quite evident from other comments which followed that "hard-boiled" tactics were considered out of date and ineffective and that group talks by the foreman were considered insufficient without personal conversations by him with his men.

J. R. Cline, assistant superintendent of the Universal Atlas Cement Co. at Universal, Penn., read an interesting paper on the effect of mill safety work on safety in the home. Mr. Cline stated that while 28 cement mills had completed 1929 without lost-time or more serious accidents, he doubted whether 28 workmen's homes could be picked in which the same would be true. The case of a workman who worked safely at the plant and fell from a ladder, breaking a leg, was cited to show that different and far more lax safety standards prevail in the home than in the plant.

Cement and Quarry Sections' Luncheon

Due to inability of J. B. John, president of the Medusa Portland Cement Co., and chairman of the committee on accident prevention of the Portland Cement Association, to be present, E. D. Parry acted as chairman of the joint luncheon of the cement and quarry sections Wednesday noon. Mr. John was absent on a trip to Osborn, Ohio, where he represented the association in the presentation of a safety trophy to the Wabash Portland Cement Co. for a perfect safety record during 1929.

The luncheon speaker was Colonel Reninger, of the Lehigh Portland Cement Co., past-president of the National Safety Council. He traced the interesting history of the organized safety movement in the cement industry since its inception in 1913 and predicted a future as conspicuous for outstanding accomplishments as has been the past. Colonel Reninger told his listeners that no project of any kind undertaken by the Portland Cement Association has been as fruitful in good will, lasting publicity and actual returns on the money expended as the safety work of the association had been.

Joint Session

Wednesday afternoon's joint session of the cement and quarry sections proved an interesting one. As an opening feature, Walter A. Darling of Cincinnati, who lost his eyesight in an industrial accident, talked on "The Cost of an Accident." Mentally alert, an excellent speaker and a man of experience beyond his years, Mr. Darling told the story of his mishap, his impressions, his attitude toward accidents in general and summed up the cost in a manner which probably brought a resolve from everyone present to stop taking chances or permitting those around them to do so.

Dr. Harold S. Hulbert of Chicago, one of America's leading psychiatrists, read a scholarly paper on "Mental Self Discipline." Dr. Hulbert, whose services during the World War attracted attention on both sides of the Atlantic, spoke of mental self discipline as a tremendous aid to safety both in handling one's self and others. His paper constitutes a valuable contribution to thought on the subject and should be read and studied by all who are in responsible charge in industry. It is published in full elsewhere in this issue.

Quarry Section Meetings

The principal business of the quarry section was the re-election of most of its present officers. Those for the ensuing year are: A. L. Worthen, Connecticut Quarries Co., New Haven, Conn., chairman; D. B. Buettner, Jr., France Stone Co., Toledo, Ohio, vice-chairman; V. P. Ahearn, National Sand and Gravel Association, Washington, D. C., secretary and editor of the Section News Letter; J. R. Boyd, National Crushed Stone Association, Washington, D. C., chairman of the publicity committee; H. F. Yotter, General Crushed Stone Co., Easton, Penn., chairman of the poster committee.

Activities of Section

Chairman A. L. Worthen reported the activities of the quarry section during the past year as follows:

"Following the annual Congress last year the executive committee met on October 24, 1929, at New York City, to discuss plans for the year. There were two important tasks facing us: To build up the membership of the quarry section so that it might be considered representative of the industry and thereby helpful to it, and to make further study of the 'Safety Manual for Quarries' in accordance with the motion as adopted by the section at the Congress last year. Both of these problems will be discussed later in this report.

Posters

"The poster committee of our section has during the past year issued the full allotment of safety posters allowed us by the council. Copies of these posters will be found on display in this room. Our section is at present privileged to publish a safety poster every other month, but we are endeavoring to have this allotment increased to one each month. The hazards of our industry are sufficiently numerous to give us ample material for a greater number of posters than we have so far issued.

"Posters are an important and effective factor in accident prevention. By bringing to the attention of quarry workers the hazards of our industry and constantly impressing the workmen with the risks with which they come in contact, the display of posters will undoubtedly be productive of good results.

"The posters issued by the various sections of the council are illustrated in each monthly edition of the *National Safety News*. The council also issues annually a catalog of posters from which may be selected such posters as each of you feel would best serve your purpose.

"Subject material for posters has been gathered within the past few months sufficient for some while and these posters will be issued regularly. Possibly some of you have used home-made posters in connection with your accident prevention work. If so, the poster committee would much appreciate it if you will let us have some of this material to work up for the industry. Each one of you present has ideas which would assist us in producing posters suited to quarrying. Give us the benefit of your ideas along these lines and help us in issuing such posters as will be of most value to the quarry section.

News Letter

"We have put out five *News-Letters* during the past year and the measure of cooperation extended by the members in providing material for these letters has been considerably improved over the situation the previous year. There is still room, however, for wonderful improvement in this connection and it is highly desirable in order for the section to have a *News-Letter* worthy of the name, for the various members of the section to constantly have in mind the forwarding of interesting material to the editor.

"Editing the *News-Letter* is a most difficult task and we would welcome suggestions as to how this letter can be made more helpful and interesting to the section.

Publicity

"Releases of the transactions at the meetings of the executive committee were sent to the trade papers, but the major part of our publicity this year has been in connection with the drive for new membership. This will be discussed later in the report of the membership committee.

Statistics

"The work of the statistics committee consisted in the preparation of accident statistics of 125 quarries covering the year 1929, and the presentation of these statistics to the Chicago headquarters of the National Safety Council for publication in the yearly report entitled 'Industrial Accident Statistics'; also progress in the preparation of similar statistics for 1930.

"I am happy to be able to state that the accident frequency rate for quarries in 1929 represented an improvement over the three previous years. The accident severity rate was not as favorable as that for the two previous years, although it was still considerably better than the rate which prevailed in 1926. The rise in the severity rate was due to the occurrence of fatal and permanent injuries at a relatively small number of plants.

"Among the 27 industries for which the National Safety Council published accident statistics for 1929 the quarry industry ranked 15th from the best in accident frequency, but 26th from the best in accident severity. This indicated that the average period of disability from quarry accidents was relatively high as compared with other industries for which figures were published. The combined accident frequency rate for the 27 industries was 25.53 per million man-hours of exposure, the rate for quarries being 26.71, which is 4.6% higher than the average. The combined severity rate for all 27 industries was 2.23 per thousand man-hours as compared with 6.11 for quarries, which shows that the quarries had a rate which was more than 2½ times as high as the average for all of the industries combined.

"It may not be reasonable, as yet, to expect the quarry industry to establish as favorable an accident rate as that for some of the industries enumerated in the council's report, but it is certain that the quarry rates can be reduced below the present level. An improvement over past years has already been recorded and further progress may undoubtedly be expected from a continuance of the interest in safety work on the part of a large number of producing companies.

Membership

"The membership records of our quarry section since the Congress a year ago show progress. Our section has an enrollment of 102 members today; a year ago we numbered 70. During the period from October 1, 1929, to September 1, 1930, we enrolled 32 new members and lost 8 members through cancellations.

"New members were obtained by direct solicitation on the part of our members and by mail approach. A careful check of directories and lists gave us a selected list of 200 prospective members—quarrying companies of sizable operations employing an average of more than 25 workers.

"During the year this list received the following numerous solicitations [which were reported in detail].

"A summary shows that each prospect received seven general appeals to affiliate and four specific quarry appeals during the year. This mail campaign brought us in a total of 14 members with annual dues aggregating $382.

"Many of our members have helped by writing to prospects, usually at the suggestion of headquarters. Their endorsements were of vital assistance in the obtaining of some of the members listed above and in the remaining total of 32 new members with aggregate dues of $919.50.

"In conclusion, I believe that our cause, its aims and purposes and our council service have been presented to the industry. Future solicitation will become more and more specialized and result in individual approaches to companies rather than general mail appeals. In the future we will progress in proportion to the help given by the members of our section in soliciting those quarries which are not yet members of our National Safety Council."

First-Aid Training

J. J. Forbes, supervising engineer, Safety Division, U. S. Bureau of Mines, Pittsburgh, Penn., sketched the history of first-aid training in industry, stating that to date 425,000 had thus been trained. Such training is not only valuable in itself in emergencies, but it is a very effective method of safety education.

Incidentally it was brought out that the Connecticut Quarries Co., New Haven, Conn., of which Chairman Worthen is vice-president and general manager, is the first quarry organization to be 100% trained in first-aid. Mr. Worthen said his hardest job was to sell the superintendents, but that subsequent experience was that the interest of superintendents and men was so keen that they voluntarily took the 15-hr. course without pay, and many gave much more of their time for the instruction of others. Mr. Forbes said that he favored voluntary (unpaid) training, and that of the thousands who took the course in the past year probably not more than 5% were paid for their time by their employers for taking the course.

Pennsylvania Reduces Quarry Accidents

Thomas J. Quigley, chief, Mines and Quarries Section, Pennsylvania Department of Labor and Industry, said in part:

"Pennsylvania is one of the pioneer states in the quarrying industry.

"Long before the birth of concrete roads, bridges or reinforced concrete buildings, quarrying was a very important industry in supplying the steel mills of Pennsylvania with limestone. Very little attention was given to the quarry industry from a standpoint of safety or accident prevention until April, 1925. The Hon. Gifford Pinchot, governor of Pennsylvania, appointed Richard A. Lansburgh Secretary of Labor and Industry. Shortly after the appointment of Secretary Lansburgh he decided to make a survey of the quarries in Pennsylvania for the purpose of reducing the fast-mounting accidents in the industry.

"In April, 1925, I was appointed to make the survey and make recommendations for the prevention of accidents. I made a survey of the industry, visiting sand pits, limestone, granite, trap rock, cement rock and slate quarries, making a special study of the different hazards found in the different kinds of quarries. The survey completed, we prepared safety regulations to protect the workers in the industry. Tentative regulations were printed and distributed among the workers and operators, public and group meetings were held throughout the state. Every person attending these meetings was given ample opportunity to express his approval or disapproval of the regulations. When they were adopted, they had the approval of practically every important operator in Pennsylvania.

"A campaign of education was then started to educate the workers regarding the new regulations. Copies were placed in the hands of all the workers, safety committees were organized at all the quarries, plant meetings were held in the quarries. Speakers explained the regulations and appealed to the individual workers to co-operate with the state and the management for the reduction of accidents. Community meetings were held in churches, high school auditoriums and theaters. Motion pictures depicting safety were shown at the meetings to help spread the safety gospel among the workers. Speakers were furnished for all the meetings to deliver safety talks to the workers, their wives and families. Thanks to the very high grade of men who owned and operated the quarries in Pennsylvania, they co-operated 100% with the State Department of Labor and Industry and spent thousands of dollars for music, entertainment, pictures and printing to put the safety movement over. As proof that our campaign has been a handsome success, I quote you the following accident figures:

"The new regulations went into effect January 1, 1926. In 1927, the first year of our operation under the new safety regulations, we had a reduction of 10.2% in accidents as compared with 1926; in 1928 a further reduction of 4% as compared with 1927, and in 1929 a reduction of 10.8% over 1928, or 25% accident reduction in 1929 as compared with 1926.

"For three consecutive years we have shown a reduction each year and for the first eight months of 1930 our accident records show 6% below 1929 or 31% below the figures for 1926. When an industry can show a reduction in accidents for four consecutive years, what owner or operator can advance an argument against the methods used in Pennsylvania to reduce accidents? Personally, I feel that the quarry owners in Pennsylvania have made a record to feel proud of.

"One of the most outstanding records was made by one of the large quarrying companies in the eastern part of the state. In 1927 this company had 308 lost-time accidents, or one accident each working day, working 26 days each month. In April, 1928, this company started safety work and reduced the number of lost-time accidents to 158 for the year 1928. In 1929 they showed a further reduction of 59 accidents for 12 months, and for the first seven months of 1930 they showed 5 lost-time accidents at all of the eight plants operated by the company, employing about 800 men—an average of less than one accident per month in 1930 as compared with 26 accidents per month in 1927. Prior to 1928 this company seldom, if ever, operated one month without a lost-time accident. I quote for you the records of six quarries which this company operated in Pennsylvania:

"Quarry No. 1—Has operated 208 days without a lost-time accident.

"Quarry No. 2—Has operated 727 days without a lost-time accident.

"Quarry No. 3—Has operated 608 days without a lost-time accident.

"Quarry No. 4—Has operated 408 days without a lost-time accident.

"Quarry No. 5—Has operated 190 days without a lost-time accident.

"Quarry No. 6—Has operated 166 days without a lost-time accident.

"Many other quarries in Pennsylvania have made remarkable records:

"The General Crushed Stone Co. quarry at Rock Hill, Penn., had a perfect record in 1929.

"Ormrod Quarry, Lehigh Portland Cement Co., had a perfect record for two years.

"Ormrod No. 2 Quarry, Lehigh Portland Cement Co., had a perfect record for one year.

"The John T. Dyer Quarry Co. had a perfect record for two years.

"Hercules Cement Co., Stockertown, had a perfect record for one year.

"Lone Star Cement Co., Nazareth, has a perfect record for one year.

"Medusa Portland Cement Co. at York had a perfect record for 18 months.

"Giant Portland Cement Co., Egypt, had a perfect record for one year.

"The St. Clair plant of the Pittsburgh Limestone Co., Williamsburg, Penn., went two years and three months without a lost-time accident and has now gone 14 months with one lost-time accident in three years and five months. This quarry is producing from 3000 to 4000 tons of limestone each working day.

"And last but not least, the No. 4 quarry, Pennsylvania-Dixie Cement Corp., Nazareth, Penn., the pride of all quarries in the old Keystone state, with the magnificent record of four years and 10 months, free of accidents. The last accident in this quarry was October 31, 1925. The record of the Penn.-Dixie Cement Corp. is surpassed only by the Cowell quarry of the Cowell Portland Cement Co. at Cowell, Calif., which had its last accident August 14, 1925, and the quarry at the Iola, Kan., plant of the Lehigh Portland Cement Co., which had its last accident September 18, 1925.

"Many other quarries in Pennsylvania have made similar records. To continue to enumerate all of the quarries in Pennsylvania that have made such records would take up entirely too much of your valuable time. I believe that what I have enumerated above is sufficient to show you what has been done in Pennsylvania.

"These records I have just quoted prompt me to make a suggestion—

"Many of the delegates present here today are also members of the National Crushed Stone Association. It has been my one ambition to see the National Crushed Stone Association go into accident prevention on the same basis as the Portland Cement Association. It was my pleasure two years ago to attend the National Crushed Stone convention in Cleveland, Ohio, and I say without fear of contradiction, I never met a finer body of men in all my life. I would like to see the National Crushed Stone Association select a man of the type of A. J. R. Curtis, put him in direct charge of the accident section and go after accidents with a determination that accidents must stop. I am confident that a real live man in charge of the accident prevention section would return handsome rewards to your association.

"Another suggestion I wish to make is regarding compensation insurance charges. It is very unfair to those of you who employ full-time safety engineers and those of you who do not, but maintain plant safety committees and are members of the National Safety Council, also your local councils, and are constantly working to keep down accidents, to be compelled to pay for the fellow who does nothing to prevent accidents and who thinks all of us who are preaching accident prevention are a lot of fanatics. I also have in mind the fellow with a ground-hog hole, who starts work every time he gets an order for 50 tons of crushed stone. His plant is unsafe, his machinery unguarded. Personally I feel that we should demand a different classification of quarries. It is my personal opinion, plants should be rated not only on a physical basis but also on an accident basis. I believe quarries should be classified on an accident basis somewhat as follows:

"Class 1—Plants where less than 2% of the employes were injured the previous year.

"Class 2—Plants where less than 5% were injured.

"Class 3—Plants where less than 8% were injured.

"Class 4—Plants where less than 12% were injured.

"Class 5—Plants where more than 12% of the employes were injured.

"The percentages I have used are simply for the purpose of illustration, but I firmly believe, if this principle was enforced, our accidents would be reduced and the undesirables driven out of the quarrying industry.

"There is an old saying, 'Accidents will occur as long as men work for a living.' That is true, but it is also true that as long as men work for a living, those who employ them are bound by the laws of God as well as the laws of the different states to protect those who work for them. Through the years that I have been connected with the Department of Labor and Industry I have investigated many accidents, and I say truthfully, if I was the owner, operator or superintendent of some of these plants, my conscience would bother me to the end of my life. From such cold-blooded officials you usually get the reply, 'And as long as men work for a living, men will be killed.'

"It is to this cold-blooded type, who either fail or refuse to practice accident prevention, and who disregard all state and safety laws, that we should direct our attention for the good of the industry and the protection of the God-loving and man-protecting employers who have the interest of each and every one of their employes at heart."

Work of the National Safety Council

J. V. Scott, director of the service extension division of the National Safety Council, outlined what the Council is and what it had done for the quarry section. Otho M. Graves, vice-president and general manager of the General Crushed Stone Co., Easton, Penn., described how he and his company became interested in accident prevention. Norman G. Hough, president and general manager of the National Lime Association, Washington, D. C., stated that he intended to do a great deal more than had been done to interest the lime industry in accident prevention.

Statistics for 1929

W. W. Adams, statistician of the United States Bureau of Mines, Washington, D. C., reported as follows:

"A statistical survey of the quarrying industry in the country during the calendar year 1929, made by the United States Bureau of Mines, Department of Commerce, showed that 126 men were killed and 9810 were injured in this branch of mineral industry. The death rate, for men employed both in and about the quarry and at outside works, was 1.65 per thousand 300-day workers, which was an increase of 13% over 1928, when 119 men were killed. The injury rate of 128.14 decreased 1% from the 1928 figure, which was based on 10,568 injuries.

"Of a total of 85,561 men employed in quarries of various types, the largest group of workers was the 36,134 men at limestone plants; this was followed by 20,687 cement-rock workers; 11,195 at granite quarries; 6658 at marble quarries; and 3736 at sandstone and bluestone quarries; 3599 at trap-rock quarries; and 3552 at slate quarries. At limestone quarries 58 men were killed and 5315 were injured, with resulting fatality and injury rates of 1.87 and 171.46. Twenty-six of the cement-rock workers were killed and 944 were injured, the fatality and injury rates being 1.20 and 43.48. In the granite group 23 men were killed and 1515 were injured, with fatality and injury rates of 2.49 and 163.85 respectively. At marble quarries 5 men were killed by accidents and 609 were injured, the fatality and injury rates for this group being 0.79 and 95.62. In the sandstone and bluestone group, 1 employe was killed and 343 were injured, with fatality and injury rates of 0.39 and 134.99. In the trap-rock quarries 11 men were killed and 592 were injured, resulting in a fatality rate of 4.07 and an injury rate of 218.93. Slate quarries, the smallest of the group in point of the number of employes, reported 2 men killed and 492 injured, with a fatality rate of 0.67 and an injury rate of 164.55.

"All fatality and injury rates are based on 300-day, or full-time, workers. The number of days that quarry employes actually work varies from year to year and from state to state, hence the hazards of their occupation are not the same and accident rates based on the average number of employes as actually reported would not be comparable. By reducing the number to its equivalent of 300-day workers, the accident rates indicate more accurately the liability to accidents to which the employe is exposed.

"Of the 126 deaths in the entire industry, 78 occurred in the quarries and 48 at outside works, while 6173 injuries were caused by operations inside the quarries and the remaining 3637 occurred on the outside.

"The principal cause of death inside the quarries was falls or slides of rock or overburden, which accounted for 19 deaths. Explosives ranked next with 17 fatalities, followed by 9 from haulage, 8 from falls of persons, 7 each from machinery and boiler and air-tank explosions, 3 from electricity, and 2 each from handling rock at face and drilling and channeling. There was one death caused by falling objects, and the causes of the remaining three fatalities were not designated. Handling rock at face was responsible for 24% of the injuries inside the quarries; over 1400 injuries of the 6173

reported as occurring in and about the quarry being reported under this head. In outside works haulage was responsible for 14 deaths, machinery for 13, falling objects for 5, falls of persons for 4, electricity for 3, burns for 2, flying objects and handling rock by hand for 1 each, and miscellaneous causes for 5. The greatest contributing factor to injuries at outside works was flying objects, which caused 641 injuries of the 3637 reported.

"Pennsylvania employed 14,478 men in the quarrying industry, the largest number employed in any state. Ohio followed with 5978, Indiana with 5407, Illinois with 4381, California with 4366, New York with 4322, and Vermont with 4148. As a natural sequence Pennsylvania had the greatest number of fatalities and injuries, 20 deaths and 1227 injuries occurring in that state."

Saving Money Through Accident Prevention

Otho M. Graves, vice-president and general manager, General Crushed Stone Co., Easton, Penn., spoke of the experience of his company with self-insurance, coupled with active accident prevention effort. Three years ago, when the company first became actively interested in accident prevention, its employers' liability insurance premiums were about $50,000 a year. To provide against excessive losses under its self-insurance plan, the company carries catastrophe insurance to $250,000 liability from claims arising from any one accident of over $10,000.

Estimating that insurance premiums for the 2½ years the self-insurance plan has been in effect would have amounted to approximately $130,000, a saving has been effected of approximately $62,000. Mr. Graves pointed out that the estimate was not entirely accurate, as probably something less than $130,000 would have been required for premiums, because of the improved accident record of the company. He did not recommend self-insurance under any and all conditions. His company carries regular employers' liability insurance on its Massachusetts plant.

New Haven Trap Rock Co.'s Self-Insurance

William E. Hilliard, general manager of the New Haven Trap Rock Co., New Haven, Conn., described in detail the self-insurance plan of his company as follows:

"Money can be saved by reducing the accidents in any concern. If a concern carries compensation insurance it may perhaps benefit directly in getting a better insurance rate on its policies after it has demonstrated over several years that as a company it is a preferred risk. Also, it may benefit indirectly by the fact that basic rates are determined by the insurance companies on the average experience of a whole industry, so that if one or more concerns in an industry can reduce their accidents, eventually that will be reflected in at least a slightly lower rate among the various competing insurance companies.

"If a concern carries its *own* compensation insurance, of course it is self-evident that fewer accidents with lower total payments mean an immediate saving directly in the firm's own bank account.

"It is clear, then, that whether a concern carries its own insurance or not, any reduction in its accident experience saves money in the end.

"The company I represent, the New Haven Trap Rock Co., has carried its own compensation insurance since it began business in 1915. While it is not safe to draw general conclusions from the experience of any one company, nevertheless I am glad to present today a brief statement of our experience in saving money directly in our own bank account by aiming constantly to keep down our accident hazards.

"Our company operates one large trap-rock quarry located at North Branford, Conn., a small country town located about ten miles northeast from New Haven.

"Our company employs at the present time about 130 men. Some years ago we employed about 150 men. As is quite generally the case throughout our industry, the use of improved machinery and methods makes it possible for us to produce more stone per month with the smaller force *now* than we were able to produce with a larger force previously.

"We operate a railroad six miles long, from our quarry to rail connection with the N. Y. N. H. and H. railroad, and with our own dock terminal on Long Island Sound. During our operating season from 20 to 25 men included in the figures given above work on this railroad. During the three months or so when we shut down in the winter, nearly all of the railroad men are released. In the quarry and mill at that time our total working force is reduced to half of its normal size, or less, and is occupied mainly with repairing and overhauling the plant and machinery; although a certain amount of drilling in the quarry is carried on at favorable opportunities during these winter months.

"From the very first it was decided that the company should carry its own compensation insurance. Each month an amount equal to 2% of the pay roll was set aside in the books of the company by debiting compensation insurance expense account and crediting compensation insurance reserve account. The 2% was about what insurance companies would have charged us at that time, in 1915 and a few years immediately following.

"Our quarry is in Connecticut and subject to the laws of that state. In 1915 weekly compensation for injuries was paid at the rate of half of the man's average weekly earnings during the preceding six months, or for a shorter period if he had not worked six months with that same concern, but with a maximum compensation of $10 per week; in case of death, his dependents were to be paid at the same rate for a period of six years.

"Every two years or so the law was changed in some particulars, with the general tendency to increase the maximum for lost time or for death. Finally, about the year 1923, the law was changed to read, 'an injury sustained in the course of his employment or an occupational disease.' The maximum weekly rate was advanced to $18 per week. In 1927, by a further revision, the maximum was raised to $21 per week, which is the maximum at the present time.

"The insurance companies naturally had to increase their rates considerably at different times to cover the added financial liability created by these changes in the law; and in spite of that, it has been generally understood that most insurance companies, as a rule, have not made much profit on their compensation insurance business.

"Under the present status of compensation paid for lost time or for death from injuries sustained in the course of one's employment, many surprising cases came up in Connecticut for decision. In one large city in Connecticut a teamster died from sunstroke sustained on a hot summer's day. The commissioner ruled that as the dump cart the man was driving had no umbrella or other protection overhead, and the consequent exposure to the sun caused the man's death, it was an injury arising out of his employment and his widow was awarded compensation for half of his pay for six years.

"The president of a New Haven construction company drove in an open car one cold winter's day half way across Connecticut to inspect a contract on which his company was working. He caught a severe cold, developed pneumonia, and died. His executor put in a claim that his death was caused by an injury arising out of his employment and obtained an award for the widow of $21 per week for six years, which was the maximum under the law. Under the old law, such a case could never have been considered as an injury for which compensation should be paid.

"So much difficulty was encountered about the state in connection with cases of hernia that in 1927 the law was revised and not left wide open in this respect, which was the case for a few years previous to 1927. In our own company we had several cases in this period. One man was operated on and awarded the usual weekly compensation and all hospital bills and medical fees of every sort were paid by the company. He claimed to have received a severe strain in the course of his work, causing the hernia. He returned and worked for us several months and then left to go back to Italy. Before going, he told some of his fellow workmen with great delight that he had put one over on the company in connection with his operation, because he had sustained a hernia in Italy several years previous. A doctor in New Haven advised an operation and so he thought he might as well try to get it out of the company. Many concerns in Connecticut endeavored to have physical examinations

made of all new employes, largely to prevent cases like this from arising. Of course the expense of many such examinations would soon amount up to the total cost of one hospital case. In 1927 the revision states that 'an employe must prove that the hernia resulted from an accidental injury, that inability to work immediately followed such accident, that there was not a pre-existing hernia at or prior to the accident, and that any claim on account of hernia must be made within two weeks of the alleged time it was incurred.'

"This reduction in risk in hernia cases is one of the few changes in favor of the employers in the last 15 years, as practically all the changes in the law have been in the favor of the employes. I do not question the wisdom of the present law in Connecticut, as we all agree that full and ample protection should be awarded all workers. I am merely making the point that it has become steadily more and more expensive to pay for accidents, and therefore any substantial reduction in accidents means a much greater saving than would have been the case 10 or 15 years ago in the same circumstances.

"From time to time we raised the rate we charged ourselves in our company, which was 2% of our pay roll in the beginning, until we reached the rate of 5%, which was about what we were quoted by insurance companies if they were to get our business.

"At the end of 15 years ending December 31, 1929, we had accumulated in our reserve account $74,900. This represents the amount left in the reserve after having deducted all the payments we made on account of accidents. At first sight it would appear that we had saved that amount of money in 15 years by carrying our own compensation insurance. There are, however, a number of important offsets to be taken into consideration.

"*In the first place,* we may have charged ourselves somewhat more than the rates we would have had to pay during this time. If we have charged ourselves 10% to 15% more than the insurance companies would have charged, our reserve would be $7500 to $10,000 higher than necessary.

"*In the second place,* we have some unpaid liabilities against this reserve. If tomorrow at noon some insurance company were to accept our policy and we no longer carried our own risk, any accidents after noon tomorrow would not be our responsibility. We would, however, have to keep on making weekly payments to several widows and several men now receiving compensation for injuries. Probably from $7000 to $9000 would be required for that purpose. The exact figures could not be ascertained in any way in advance, because such risks are contingent. If the widow of a man who is accidentally killed has no children and is receiving compensation, and was the man's only dependent, in case of her own death before the six years is up, the compensation ceases. If there were children, and the widow herself dies, the children would receive a portion of the original award each week, but not the full amount. If a man who has no dependents is permanently crippled and cannot work, he receives compensation for ten years, but in the event of his death such compensation ceases.

"*In the third place,* in connection with the federal income tax and with the state income tax in Connecticut, which is figured much in the same way as the federal income tax of corporations, we have had to pay more taxes than we would have paid had we not carried our own compensation insurance. For instance, in the year when we first started, assume we set up as a liability $10,000 in our reserve account and charged off that $10,000 as expense. The actual payments checked out for medical services, hospital bills and compensation claims in that year we assume to have been $7000. We would then have $3000 left in our reserve at the end of the year. If we had actually paid an insurance company $10,000 as a premium that year, of course we could have deducted all that amount as an expense of operating for the year, in computing our federal income tax return. In our own case the government officials would hold that we could only deduct the actual amount paid out, which was presumably $7000, and they would hold that the remaining $3000 was really a part of surplus, since it was still in our possession on the last day of the year. In computing our income tax return we therefore would have to use the figure of $7000 instead of $10,000 as our deductions from gross income for compensation insurance expense that year. The result would be that the final net income for that year on which we would have to pay taxes would be $3000 greater than our own books showed.

"The federal income tax rate, as you may recall, was 1½% or 2% for corporations about 1915 and 1916 and then in wartime ran up to 15%. After the war this rate of 15% was gradually reduced until in the last calendar year it was 11%. If we should assume that the average during the last 15 years is approximately 10%, then we have paid out in the 15 years about $7500 more for federal income taxes than we otherwise would have paid and about $1500 more income taxes to the state of Connecticut than we would otherwise have paid. You understand, of course, that all actual payments for injuries or death claims or medical and hospital bills in any one year can be deducted in that year. If we had one disastrous year in which many expensive accidents occurred, so that the payments made by us that year amounted to a large sum, say, $25,000 or $30,000, we would only charge off against that year the usual 5% or so of our pay roll and the rest of the total amount paid would come out of the reserve carried over from previous years. In our federal income tax and our Connecticut income tax return for that year, we therefore would deduct a much larger figure for compensation insurance than our own books call for in that year. In other words, if we set up $10,000 a year for five years, it woud make $50,000. If we paid out $7000 a year for five years, it would make $35,000, leaving $15,000 in our reserve. If we set up $10,000 for the sixth year, added to the balance of $15,000, our reserve would then equal $25,000; but if a series of bad accidents in the sixth year amounted to exactly $25,000, it would just use up the total reserve. In our own books for that year we would have only the $10,000 expense charge-off, but on the federal income tax return we would be allowed to deduct the whole $25,000 paid out in that year; so that we would pay income tax on a much smaller total net income that year than our own books showed.

"*In the fourth place,* an insurance company naturally takes full charge of all claims. Accidents are reported to them and they do the rest. When a concern carries its own insurance it is necessary to spend a considerable time, over a period of years, in having the claims checked up, papers made out and signed, hearings arranged with the commissioner, payments made at required intervals to the different claimants, and closing up the record when each one has been paid in full.

"My assistant and I during the past 15 years have undoubtedly spent many hundreds of hours more in attending to these matters than we would have if we could have turned the settlement of these claims over to the representatives of an insurance company. Our time for this work has undoubtedly cost the company several thousand dollars in all during these 15 years.

"Our figures may therefore be revised as follows:

Present reserve, after 15 years		$74,900
Less 12% more than insurance premiums might have cost	$9,000	
Less claims now running to be paid in the future	9,000	
Less extra income taxes paid	9,000	
Less administration and clerical labor	3,000	30,000
		$44,900

"It appears, therefore, that as a very conservative estimate, our company has saved approximately $45,000 in 15 years, which is a rate of saving of about $3000 per year for the entire period. I am of the opinion that this figure is quite conservative and that a long and exhaustive analysis carefully computed would probably show that in my estimate I have deducted somewhat more than I should have from our present reserve to arrive at the figure of $45,000.

"I have endeavored to state our company's experience as concisely as possible, but do not wish to make it appear that I am necessarily advocating the plan for a quarry company to carry its own insurance rather than place it with an insurance company.

"We have had a favorable experience, but it is evident to you all that during the first few years, say, from the first year up to the sixth or seventh year, we were running a very considerable risk. A series of

bad accidents during those early years might have caused us to have to pay out large sums of money far in excess of what we had set up for that purpose.

"There are a great many factors to be considered in determining whether or not a quarry company should take this very considerable risk during the early years while it is building up a reserve.

"I ought to explain that we have been able during the last few years to obtain supplementary insurance for exceptional risks. We are now paying $880 a year premium to one insurance company, by the terms of which policy that company will pay for any losses incurred by us in any *one* accident which amounts to more than $10,000, their total liability not to exceed $100,000. In other words, if we had an accidental explosion in which severe and fatal injuries occurred to a group of men amounting in all to damages of $25,000, we would be obligated to pay the first $10,000 ourselves and this insurance company would have to pay the remaining $15,000. This policy, however, is limited to any one accident. If we had three bad accidents, one week apart, each causing liabilities of $8000, we would have to pay the whole $24,000 ourselves. However, we regard that excess insurance as well worth while for us to carry as a partial protection against some unforeseen catastrophe. That form of excess insurance has been developed by the insurance companies especially for concerns like ours who carry their own insurance.

"We have been fortunate in having one very able superintendent for our whole quarry and plant, Alexander McKernan, in charge during the entire period of 15 years. He has always been keenly interested in the welfare of his men and has had a great deal of influence in training them to be careful. We have also had one man in charge of our crushing mill and one man in charge of our blasting and quarry operations during this entire period. No doubt we would have had many more expensive accidents except for the care and attention that these three men have given to accident prevention.

"The subject of our discussion today is 'Saving Money Through Accident Prevention.' I have therefore endeavored to confine my remarks to that particular topic, but it is entirely impossible to consider this question, even briefly, without keeping in our minds the fact that human life and human welfare is of fundamental importance and that in our company, as in the industry in general, we are far more concerned with saving human life and preventing human suffering than we are in the financial side of the question. If these two considerations came into conflict, the problem would be terrific. Fortunately, these two problems are both on the same side. By preventing accidents we save human life and reduce human suffering and, in addition and as a secondary motive, save money. We believe our whole industry, which is necessarily somewhat hazardous, has before it a splendid opportunity in the future—by giving its enthusiastic interest and support to accident prevention—to reduce its accident rate and thereby reduce the sum total of human suffering and disaster, and at the same time reduce its own expenses and produce a needed and welcome increase in its own net operating profit."

R. E. Colville, United States Gypsum Co., Chicago, discussing Mr. Hilliard's paper, said he did not believe a small operation could be safely self-insured. Through self-insurance, he said, the U. S. Gypsum Co. saved about 35% over what it would pay in insurance premiums.

Prevention of Blindness in Industry

HOW MORE THAN 10,000 eyes and at least $46,000,000 were saved in two recent years among 583 plants, employing a total of half a million workmen, is told in the report of a study, entitled "Eyes Saved in Industry," published by the National Society for the Prevention of Blindness, New York City, and the National Safety Council.

The two organizations set out to discover the total of authenticated cases of workmen's eyes saved from serious injury or destruction through the use of goggles or headmasks. As these figures apply only to the corporations with definite records, there can be only conjecture as to the number of eyes actually saved by protective devices in all American industry.

The survey analyzes the records kept by the corporations during 1926 and 1927, and discloses that 2757 men and women were saved from serious injury or total blindness in both eyes during the two years. There were 4654 recorded instances of workmen being saved from a similar fate to one eye.

Many interesting facts in regard to protection of the eyes in industry are disclosed in this survey, which is the first of its kind ever made, according to Lewis H. Carris, managing director of the National Society for the Prevention of Blindness.

Accidents in Quarries

THE following accidents have been reported as being of recent origin by National Safety Council, Quarry Section:

In one of the plants, an old employe had been cleaning a crusher connection with kerosene. He had scraped and scraped and eventually felt that the equipment certainly must be clean. In order to make sure, he lit a match. The result was a first degree burn on the face and hands.

A crusher feeder received a bad back injury when he was pulling stone into the crusher with a hook which slipped off the rock causing him to fall into the hoist. Off duty four days and the three fellow employes that investigated the accident reported, "This accident was caused by poor judgment on the part of the feeder. A similar accident can be avoided by taking sufficient time to see that the hook is securely fast on the stone to be pulled into the crusher."

A truck driver had hauled a load of stone to be used on bin foundation work. When the load was dumped by winding a hoist with a crank by hand some stones lodged in the truck bed and a fellow employe loosened them. The truck driver had let loose of the crank and was standing nearby when the sudden release of weight from the truck bed caused the hoist crank to strike him on the jaw and the force of this blow caused him to fall against a car on which he struck the back of his head. The foreman reported a similar accident could be avoided by putting a power hoist on the truck.

A steam shovel craneman was replacing a side plate on the boom of the shovel and while going down boom ladder and holding on to the "safety" cable some barbs (broken strands of the cable) pierced his right hand. While the investigation disclosed that the cable was too good to dispose of, we feel it may be good policy to use it some place else and not for this purpose.

An Award of Honor

(An editorial in the *Pittsburgh* [Penn.] *Press*)

IT IS truly a marvelous safety record which Scott Turner, director of the United States Bureau of Mines, commemorated in giving the Holmes safety award to the Lehigh Portland Cement Co. The award was a feature of the first general session of the National Safety Congress here.

From 1924 to 1929, inclusive, one or more of the company's 15 cement plants worked through the year without a lost-time accident. Five plants had such records in 1928 and four in 1929. One plant has not had a lost-time accident for three and one-half years.

Turner paid tribute to the portland cement industry. "I do not know of another industry which so consistently, from year to year, occupies such an enviable position of leadership in the safety movement," he said.

It may be that special conditions within the industry aid in allowing this fine record to be made. But in all probability the cement companies have taken measures which could be studied with profit by leaders in other industries.

As to the Holmes award: It is in memory of Dr. Joseph A. Holmes, first director of the United States Bureau of Mines, remembered with affection by many Pittsburghers. His work as a safety leader was so outstanding that 28 national associations, and divisions of the federal government, combined, after his death in 1915, in the Holmes Association, to honor outstanding safety achievements. Winning an award given under such auspices is honor indeed.

Aids in Handling Oneself and Others, Especially in Relation to Accident Prevention and Safety*

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Chicago, Illinois

ACCIDENTS are of human origin, therefore of mental origin. A man whose mind is on his work is not a causative factor of accidents, provided, of course, the man has previously demonstrated his fitness and his capability in judgment and in agility in the particular job or role in which he is engaged. A man whose mind is on his own personal problems or interests cannot pay adequate attention to the work at hand, and is therefore a causative agent of accidents.

The mental causes of accident are thoughtlessness and carelessness in workmen with normal minds, rather than mental diseases or lack of intelligence. Distraction of attention permits hazy thinking about the work and indifference to its risks; in other words, accidents result from mental detours. Safety thinking is thinking about the work being done, not thinking of safety.

Psychiatry is the science of treating minds which have failed to function normally. In order to understand those afflicted, we psychiatrists were led to work out an understanding of all human mental reaction types, sane or insane, successful or unsuccessful. One lesson we have learned is that the emotional life of an individual is of vastly more importance than the intellectual (or ideational) part of his mental life. Emotions tend to direct attention: a man while emotional about himself cannot keep his attention directed toward his work.

Psychiatry also has its limitations, and when we cannot cure certain types of cases we can only recommend that cases of each type be collected and segregated. There is no place in competitive American industry for the insane, the feebleminded, the epileptic, the constitutionally frail or inferiors or the sick (arteriosclerotics, paralytics, seniles, or cases of arteriosclerosis, cases of Bright's disease, anemia, tuberculosis, cancer, skull fracture or brain concussion).

These persons, industrially unfit, can be easily identified by general observation and certain simple tests, and they had best be pensioned off or worked in groups segregated with others like themselves. The normal man is comfortable in mind and in body, at ease with himself, adjusted to his work and his environment and to his home life, and has a work record showing longer and longer periods of employment of better and better kind of employment (for a good work record shows he is neither sick, perplexed nor fatigued, and also shows he is not misplaced, inadequate nor discontented). The normal man has better self-mental-discipline of the same mental tendencies as the man who is a failure, whether he learned this discipline wittingly or unwittingly. It is of some of these things of which I want to speak today.

*An address given before the Cement and Quarry Section, Nineteenth Annual Safety Congress, September 30, 1930, Pittsburgh, Penn.

Classification

First, to anticipate the most frequent question asked on this subject, may I not say that there is no successful or scientific system yet evolved to place men or estimate an individual's character or characteristics. Of the various tests, I think the best is the personal interview between the employment or personnel officer and the applicant, and later an interview between the manager and the man he considers promoting to foreman. The next best test is a probationary period such as has been found so successful in better organized groups, such as Annapolis, West Point, nurses' training schools, and police departments. To date and probably thereafter, common sense and experience are better than theoretical tests whose usefulness has been only partially proved by enthusiasts.

The inequalities of human nature can be graphed in what is known as the human graph. This applies equally to all humans, regardless of the standard by which they are measured, be it height, age, wealth or poverty, promptness or tardiness, success or failure. Three per cent will be practically parallel to the base line, 12% slightly rising, 15% sharply rising, 40% top plateau, which may be somewhat domed, 15% sharply falling, 12% gradually falling, and 3% practically parallel with the base line.

The middle 70%, consisting of the sharply rising 15%, the plateau of 40% and the sharply falling 15%, are what we call normal. Observation of a man over a reasonable period of time will enable you to place him pretty well in this graph.

Day Dreaming

This type of thinking is known by various names; phantasy with a *ph*, revery, day dreaming, or, more properly, wistful thinking or wishful thinking. It has been estimated that eleven-twelfths of the thought-processes of the average person, excluding the old, are of this character.

These thoughts may be momentarily short or they may be minutes long. They are usually vague, pleasing, and highly emotional. They are usually ambitious and are often mistaken for the foundations of plans. They are regarded as harmless and the cheapest of indoor sports. But we psychiatrists now know that these phantasies are extremely bad for the individual in that they rob him of his initiative to make sound plans and the mental energy to carry out his plans. These wistful thoughts leave the individual apathetic and rob him of his interest in his work. If indulged in extravagantly, they lead to dementia praecox. As ordinarily indulged in, they lead to indifference and carelessness in the daily work.

This may be illustrated by a dull punch-press operator to whom Dr. Plant once remarked, "Why, you have ten fingers and you have been on that punch press six months!" To this she replied, "It's only them what thinks that loses their fingers." The operator was right, only she did not realize that she meant the phantasy type of thinking.

These phantasies can be identified and handled as follows: a phantasy usually begins with one of three phases, "I wish," "When," or "If." Whenever a phantasy enters the mind of an individual, he should do one of two things: he should either do something motor about it now—that is, use his hands to change the phantasy into a somewhat started or completed plan—or he should dismiss the thought from his mind and preserve his mental integrity and his interest in ordinary affairs.

There is a second form of phantasy which has most of the characteristics of the previous type, except that the mood is a depressed or anxious one and that the time is the present or the immediate future. This is called worry. The mind is filled with highly emotional thoughts, the ideas of which are incompatible with each other. The advice is the same: do something about it. The worker whose mind turns to worried thoughts about his wife in the hospital and the ability of his daughter to get her own breakfast, should be permitted to 'phone his home before school hours and to call the hospital several times during the day, otherwise his abstraction will take his mind from his work and lead to carelessness.

Persons who worry are those who for-

merly indulged in anticipatory reveries to a great extent. Usually they are not in the best of health and are not living normally. Nowadays some of the most common causes of worry are birth control or indulging in sex starvation or sex experimentation.

The third form of phantasy is the retrospective reverie. It begins with, "Oh, if the past had only been different!" This leads to an incurable paranoid insanity, because when such thoughts enter the mind nothing motor can be done to alter the past. It is imperative that such thoughts be dismissed from the mind. People need instruction in rational forgivefulness and also in rational self-forgivefulness, the peril of which is indulgence.

The open, frank, non-seclusive, but reactive type of individual is the wholesome one. Ambitions should be limited to what is practical in attainment. A man should be encouraged to prepare himself for the next higher job above him. The advice, "Hitch your wagon to a star," or, "Be ye therefore perfect," is so impractical that it is hurtful to personality. Ambitions which are more generalized should replace them; for example, "Be faithful and planful," or, "Never get tired of doing your best."

Anger

The most common form of anger is from the thwarting of some impulse. The primitive form of this kind of anger is personalized. The person thwarted wants to destroy whoever put the obstacle in his path. Primitive anger shows itself best in a quick resentment, and at its worst in thoughts of revenge. The civilized form of anger is depersonalized anger; that is, a strong determination to overcome obstacles.

There is a most pernicious form of anger which should be avoided, and that is self-anger, or self-reproach, because it is inevitably baffled anger. Anger without an outlet is sickening; it is harmful to physical and mental health and to one's work. Conflict is normal in healthy males, but contemplations on conflict lead to abnormality. Socialized conflicts, within rules, such as quoits, baseball, or even pinochle, are vastly better than angry broodings. The angry workman, emotionally interested outside of his work, is little interested in his handiwork, and is an easy prey to absentmindedness. The determined man while at work substitutes his work for his problem, is energetic and helpful, and is not apt to cause accidents which reflect on him.

The reaction of exasperation is often a cause of accidents. A man will tug at a piece of machinery to get it in place, using what he believes to be the right amount of strength. Then, being exasperated, he may yank it or hammer it ruthlessly and cause something to break or slip and thus precipitate an accident. Men should be taught that it is results, not efforts, that count, and that the group cannot proceed until each man's work is well done.

A persistently impetuous man cannot be deliberate or discipline himself, and the company will do well to let him go. The impetuous man makes mistakes not from fascination, but because of alcoholic inheritance or because he is hungry for something. Impetuous men are unreliable workers. They are almost as unreliable as stammerers, who have psychic ataxia and jerkiness in speech.

There is another form of anger which is an increase of irritability without any apparent increase of provocation. When a man is more irritable than usual for a day or so, it is safe to assume that he is in pain. The pain is more often physical than mental. It may be a symptom of some developing disease, a dental cavity, or eye strain. A man may be ill at ease because his wife is pregnant. In any case, a temporary increase of irritability is sufficient cause for a supervisor to send the man to the company doctor.

Criticism

It is important in the training and handling of men, and equally important at home in the training of children, to differentiate between an offense and an offender. One may disapprove or hate a characteristic in a person, but one should not therefore hate the individual.

Never totally criticize a person. Never let your foreman say, "Oscar, you damn big Swede, why in hell did you do that?" You should train your foreman to say, "Why, Oscar, I am surprised that any man who is always here on time and never seen drunk on a Monday morning would make a mistake like that. What the hell?"

If the foreman handles him in the first way, totally criticizing him, the man will develop a grudge against the work, against the company and against himself. He will brood over his wrongs with the constant tendency to be abstracted and in peril of causing an accident. If the foreman handles him with the better technique, the man will tell his wife that the company has noticed that he is never drunk and that he is always on time, but will not mention the mistake. He will be more alert at work to avoid mistakes and deserve favorable comment. The ratio of two slaps on the back to one kick in the pants is a good one.

A workman should not be criticized to his equals, lest the speaker be quoted and his criticism reach the workers in garbled form. It is permissible to criticize the worker to his face and, of course, to report on him to his superiors. Even in such cases, however, the offense should be distinguished from the offender and his good characteristics as well as his faults reported.

The word "shame" should never be applied for a physical condition to any person, especially to a child or young workman. To tell a workman that he should be ashamed of himself because he did not wash his hands before eating in the lunchroom of a lead factory tends to make him slovenly and hurts his self-respect.

Forgivefulness

When a man has been fired, docked, laid off, criticized or otherwise punished, he should be given a receipt in full and placed in good standing when he is forgiven and returned to work. His next effort must be made a successful one, and it is the duty of the foreman and those of still higher rank to assist him and to arrange that the return to full duty is accomplished with approval and is successfully fulfilled.

The same is true with men who have been laid off because of injury. These men have suffered more or less shock, hence when they first return to light duty and when they are returned later to full duty, the authorities must see to it that the duty is successfully performed and that the man is told that they approve of his efforts and successes.

Happiness

Happiness may be regarded as the opposite of anger. Happiness is the emotional state which accompanies the carrying out of ideas and plans if these plans were, in part at least, of the individual's own making, whereas anger is the emotional state which results when the carrying out of one's plans is baffled. Practically every sentence in this article is based on the tragic life history of one or many individuals. It was my duty during the war to become acquainted with the hospital care of sick and wounded British soldiers. These men were called "Blue Boys" because the hospital uniform was entirely blue. At the hospital where these experiments were made, the Blue Boys had been thoroughly institutionalized by being there many months. They had been thoroughly studied and records had been kept of their reactions.

One incident will show the effect of happiness on physical effort. A certain group was assigned to certain medical officers. One doctor was on the first floor and another on the second floor. All day long this group of soldiers sat in the office downstairs and at intervals one would come to the doctor's desk to have his pulse and blood pressure recorded. He would then walk up the long flight of stairs for a similar test. These soldiers would repeat the test at half-hour intervals during the day, day after day and week after week.

One Saturday morning a sergeant major came into the room where the soldiers were waiting and read a list of names. Those whose names had been read would not be permitted to have "shore leave" or leave to go downtown for Saturday afternoon or evening. It was observed that the next time these disappointed soldiers walked upstairs their blood pressure was lower and their pulse rate was higher.

Then about two hours later the sergeant major came into the room and announced some mistake on his list, that it was Smyth, not Smith, or Robertson instead of Robinson who had been denied leave. On the next test the men who had regained their happi-

ness were able to walk upstairs with as little effort, as shown by the blood pressure and pulse data, as they had on previous days. This demonstrates again the fact that avoidance of unhappiness lessens fatigue, hence lessens the risk of causing an accident.

Fear

The use of fear as a whip to keep men in line and to do their work well lest they be laid off or bawled out must be used in very great moderation. Fear is a poor whip. To be sure, there are many men of low intelligence who may react well to fear, but in men of average or high intelligence fear is distracting to attention. Fear limits output. It produces an unwholesome state of physical health, and should therefore be saved for a few emergencies. Disagreeable foremen of whom all are in fear should be transplanted.

On the other hand, tenderness or solicitude should not be overdone. Workmen do not do well if they know they are pitied; they do less well if they develop self-pity.

Anxiety

Anxiety in the mind, with concomitant physical sense of tension, is caused by incompleteness, repression, or by self-conflict in the inner mental life. It shows itself in a depression of mood and also in doubts and indecisions. Persons in a state of anxiety need help. Problems which produce anxiety are usually those which can be understood or helped by physicians, social welfare workers, or priests. Anxiety, if intense or prolonged, may lead to hysteria or neurasthenia.

Anxiety sometimes develops after an accident while a claim is still unsettled. Then if the claimant is allowed to "jew up" the claim agent when a settlement is arrived at, there will not be the tendency to have a chronic neurosis, whereas if the claim agent "jews down" the claimant, a chronic neurosis may follow and the company loses the efficiency of a former good workmen and the community loses a self-supporting citizen.

The human mind craves certitude. Few of us can stand uncertainty. It will either give mental anxiety or produce a conversion hysteria. Almost always the cases which develop conversion hysteria are persons who tamper with sex living. Persons who are biologically wholesome are not predisposed to develop marked anxiety, but the anxiety can be about other things—finances, returning to work, and so on.

I hold no brief for persons who indulge in misconduct, but I do think a man is not as bad off if he indulges in an evening of carousing as he is spending many hours brooding about "I wonder what my wife is doing" or "I wonder if I can't get next to Joe's wife while I'm on my way home from work." A highly emotional life is more destructive than the misconduct itself.

Fatigue

There is an increase in accidents from mental fatigue or emotional fatigue from being overstimulated or overhurried too long. A short campaign is better than a long one and is followed by less reaction and is permanently followed by a more enduring improvement. Many slogans lost their stimulating ability when they became commonplace, such as "Watch Your Step" or "Safety First." A slogan particularly appeals to the man or group of men who developed that slogan, but to others its appeal rapidly fades.

Fatigue leads to accidents. Fatigue is increased by unhappiness and decreased by happiness. Happiness also increases accuracy. That a kind word or properly spoken request increases the workman's accuracy was observed in elevator operators who stop their cars more accurately with the floor level when the passengers say "Fourteen, please," than when the floor number is given in an abrupt or muffled tone. Men who are constantly unhappy should be placed at work where the accuracy risk is small or where accuracy is of minor importance.

Monotony of work leads to indifference to the execution of that work. This flagging of interest causes wandering of attention or even drowsiness. Accidents are prone to follow. What is here said, as is true elsewhere, is as applicable to executives driving their Packards as it is to workmen in the quarry or shop or factory.

Surprise

Surprise is defined as an emotional state, that is, a state of excitement, not a state of thinking, or at least not a state of clear, orderly thinking. The surprise lasts until the individual arrives at a definite thought as to what should be done under the circumstances. Surprise leads to complication of accidents. The prevention of surprise is to permit and encourage men to be decisive and to acquaint the individuals who might be surprised with the probable complications of such types of accident.

Rehearsals, such as lifesaving or training in resuscitation, are preventives of surprise. In any type of accident, experience in similar accidents leads to less surprise in case of recurrence, because the experienced person is now endowed with ability to make decisions based on previous knowledge.

Obedience vs. Discipline

Obedience means the giving of rewards for unusually good conduct or dealing out punishment for misconduct. A firm will not prosper if the superintendent is permitted to fire employes on the recommendation of the foreman, but must wait until the January meeting of the board of directors to promote a man for unusual ability. Rewards and punishment should be offered proportionately.

Discipline, by definition, means the setting of an example or the following of an example which has been set. It does not mean punishment. A disciple is a follower. In our every-day life discipline is more effective than instruction. The foreman who violates the "no smoking" rule cannot by punishment get his men to observe fire hazards.

Morals

A man cannot defy the moral code of his group or sub-group while stupefying his conscience with excuses which are satisfactory to himself but which he knows would not be satisfactory to others, without showing a decline in personality and in usefulness. This deterioration of personality, from self-indulgence, is almost as severe as deterioration from drugs. Such employes should be once warned and then dismissed.

Respect and Self-Respect

Self-respect is based on two things of equal importance. The first is good or improving health, and the second is a consciousness of the individual's own liabilities and assets. A person who overemphasizes his own limitation has a so-called inferiority complex and has crippled his occupational and domestic life, whereas a person who minimizes his limitation while he magnifies his abilities is proud, but ineffective as a leader.

The normal individual is equally self-critical and self-approving, but he is careful never to confess to others his shortcomings nor to boast about his exceptional abilities. He takes himself for granted, concerns himself moderately with self-improvement, and is concerned mostly with his work. He places the emphasis on his production and minimizes the emphasis on his overhead or himself. When an individual is in good health or improving health and has a proper balance in the two phases of self-regard, then automatically and inevitably he commands the respect of others without deliberately seeking it. This probably is the most important point in the development of personality and of usefulness in the world.

A good way of establishing a man's self-respect and at the same time disciplining him is to ask him about himself. "How are you getting along?" "What progress are you making?" "What can we do to help you?" "What do you think of yourself as an employe for such and such a company?" He will tell you. Then say, "Now describe yourself as the foreman sees you. Describe yourself as you think the doctor sees you," and make the man see himself from several points of view. He will take himself more seriously after that and he will try to do those things which appeal to the superintendent, the company doctor, and the foreman. You haven't hurt his self-regard. You have given him something to think about, and I think that is respect-building.

Effect on the Mind of Bodily Health and Nervous Breakdown

There is a close but complex relation between a man's physical health and his intellectual capacity and emotional life. In men of 40 to 55 a lessening mental vigor, imperceptible at first, is found in about one-sixth of

all cases examined. It usually is due to heart or kidney (Bright's) or blood vessel disease; these conditions are very easily disclosed by any physician by examination of the heart, blood pressure, blood and urine. Really, you men and other executives owe it to yourselves and your families and your companies to have an annual physical examination, preferably during the week of your birthday. You also owe the duty of sensible living. Drinking isn't safe, it is smart-aleck. Sweating once a week from hard work or hard exercise will add seven useful years of life to the average sedentary man.

Nervous breakdowns, so called, occur when there is at the same time a great emotional strain plus a state of poor health such as acute tonsilitis or convalescence from influenza, but they do not occur in healthy persons from emotional stress or strain, nor do they occur from poor health under ordinary stress. You cannot anticipate when death or other family or even financial strain may come to you, therefore it is of vast importance for men like you to maintain your own health at high level. See that you do it!

Inferences

Men can make or mar themselves largely by their mental habits. An inference is a conclusion based on slight data. Almost all persons regard themselves as smart enough to make inferences. Actually but few are able. The most intelligent persons rarely make inferences, but do engage themselves in getting more data, form a tentative opinion or judgment, but are open-minded and welcome still new data while they are reacting to their provisional judgment.

Most men infer unfavorably to themselves and about others, with the consequent paralysis or paresis of effort, or with diminishing friendship and diminishing approval for others. The bookkeeper receives a telephone call saying that the boss wants to see him in the office at 10 o'clock. He spends the intervening time inferring unfavorably to himself about such trifles as "Did the boss see me at the White Sox ball park on the afternoon I stayed home pleading sickness?" —"Did the boss know that I had joined the bookkeepers' racket?"—"Did the boss notice that I parked my car near a fire plug in the yard?"—et cetera ad nauseam. He might know the boss would not have sent for him unless the boss wanted something.

All conversations begin with "I want" on the part of the person inaugurating the conversation. The presumption is that the boss wanted the bookkeeper to help the boss do something the boss wanted. The bookkeeper should have inferred that he might give the boss anything from his department that the boss wanted. He would be a better bookkeeper and would soon be promoted. When one infers favorably, one risks 11% error only; if one infers unfavorably, one tends to create unfavorable circumstances.

The habit of indulging in comparisons is very common and is very dangerous. When an individual compares himself with any other specific person or when an individual is compared by an outsider to any specific persons, an unwholesome state of mind follows which shows itself in less accurate productive work.

Persons, usually between the ages of 31 to 38, sometimes show an overdevelopment of this bad habit, and we call them paranoid. Such employes are stormy petrels. They compare conditions here with conditions in Russia or in the good old days or under the former boss; they preach the philosophy that "We workers own our jobs." They are too talkative and argumentative and should be discharged, for they are as bad as a rotten apple in a barrel of good ones.

Character

Character is the sum of the decisions an individual has made during his lifetime. A person of strong character is a decisive person. A person of weak character is one who cannot make and adhere to his own decisions. Others make his decisions for him or he is vacillating in adhering to his own decisions. Usually a person of strong character is also of good moral character—for example, Roosevelt, Wilson, Gary. There are some exceptions, such as leaders in our politically protected crime gangs. These men are decisive men of strong character, but according to our code they are not of good moral character. Character can be developed in a person just as deliberately as ability in music or boxing.

Character should be developed in the home while the individual is a child by intelligent parents allowing the growing child to make his own decisions within the necessary limitations of his own judgment. For example, a good mother will say to her little son, "Dear, do you want to wear your rubbers or your galoshes to school this morning?" She has decided that he should wear some form of foot protection, and where it makes no difference to his health, she allows him to make decisions for himself. Good parents so train their children that at 18 the children can be weaned from supervision and guidance, and thereafter can decide for themselves and meet the ordinary problems of life.

After 18 the parents should continue to offer their children such financial and domestic support as is necessary, and should be willing to interfere without request or offer advice and make decisions when the child is in danger, or in vital matters, such as being vaccinated against typhoid before taking a long automobile trip.

Business character can be developed in young workmen. When a new employe comes to work at a factory or office, he should be allowed some latitude in deciding how he will fulfill his duties. A clever foreman will tell him that he can turn an object on the lathe either from left to right or from right to left. A clever head clerk will tell the new office boy that he has to deliver three envelopes to three places in whatever sequence he decides to follow. For when an individual feels that he may make some decisions about his work, he has started to develop a business character, and, other things being equal, he will be of relatively greater value to his company in future years.

The strong character who has ability to make his own decisions must, of course, be differentiated from the opinionated person who complicates the lives of others by firmly expressing the first opinion that enters his mind without weighing the pros and cons of a situation. A man accustomed to making prompt decisions is more attentive, is less predisposed to cause accidents, is better equipped to deal with an accident which has been caused, and recovers more quickly from surprise after an accident.

Normal physical health, pleasant interest in his work, comfortable adaptation to his domestic and social life and to the changes in his environment, self-respect, and the avoidance of such bad mental traits as mentioned above, are important personal contributions which any average man, who is intelligently handled by his superiors, may make toward accident prevention and safety.

Talks on Cement Over Radio

AN UNUSUALLY interesting and instructive radio address was that given by Frank H. Smith, president of the Lawrence Portland Cement Co., and head of the Portland Cement Association, over the Columbia Broadcasting System recently. For the benefit of those who missed it, here are a few of the highlights:

Thomas Edison spent countless hours perfecting the rotary cement kiln.

Portland is merely a distinguishing name with about the same significance as Irish in Irish potatoes. It was adopted a century ago by Joseph Aspdin, whose product when made into concrete, resembled stone from the Isle of Portland. He worked behind high walls and used magic to mystify the curious.

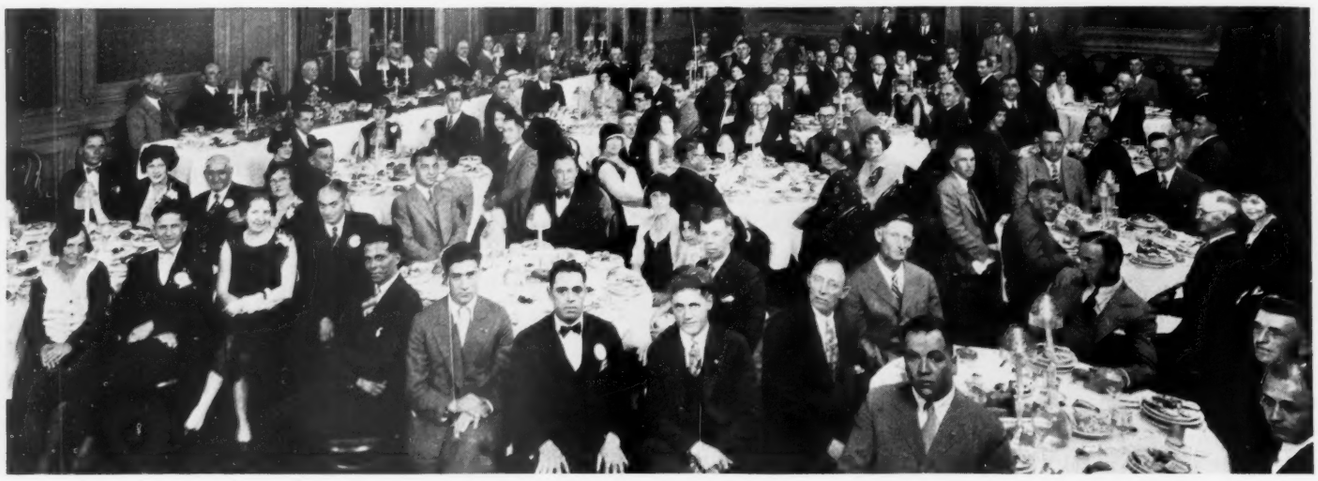
American manufacturers have equipment to make one billion bags of cement annually yet only seven-tenths of the capacity is used.

Concrete was first used as a paving material in Bellefontaine, Ohio, to prevent damage to the pavement around the courthouse by the Percherons tied to the hitching rack around the building. That was in 1892 and the pavement is still giving excellent service.

In 1909 the first mile of rural concrete paving was laid near Detroit.

Concrete is a prime factor in the construction of the growing type of one-piece or monolithic buildings and some of the world's largest water harnessing projects have found concrete of inestimable value.

Concrete now is being applied by the guniting process under high air pressure.



Banquet held in connection with the third annual safety meeting of the California cement mills at Palace Hotel, San Francisco, September 16

California's Third Safety Meeting

Annual Convention of Safety Boosters from Cement Mills at San Francisco Is a Most Successful Affair

REPRESENTATIVES OF the California cement mills met at the Palace hotel, San Francisco, September 16, for their third annual safety conference and first-aid contest. The meeting was not only a complete success but it gave visible evidence of the rapid accumulation of safety sentiment in the cement mills of the Pacific Coast.

Chairman J. H. Colton, vice-president in charge of operations of the Pacific Portland Cement Co., opened the morning session of the meeting with an attendance representing the Calaveras Cement Co., San Andreas; Cowell Portland Cement Co., Cowell; Pacific Portland Cement Co., Redwood City; Riverside Cement Co., Riverside; Santa Cruz Portland Cement Co., Davenport; Southwestern Portland Cement Co., Victorville, and the Yosemite Portland Cement Corp., Merced.

Following the procedure which has been customary in the regional safety meetings held by the Portland Cement Association, A. J. R. Curtis, secretary of the association's accident prevention committee, opened the program with an analysis of cement mill accidents in California during the past year and past five years, comparing this with the record made by plants located over the country at large. Mr. Curtis surprised many in the audience by showing the California record was behind that of the country as a whole, and prescribed as a means to improvement, more thoroughness in every phase of safety work and of operating practice. He also stressed the prevention of accidents as a major economy in the operation of California cement plants, pointing out the savings thus made were badly needed by the workmen and their families and as a means of keeping intact a greatly overbuilt industry operating on a thin margin.

Taking the operating men into his confidence, Mr. Curtis said that with the United States cement producing capacity overbuilt to an extent rapidly approaching the 100,000,000-bbl. mark, only two courses lay open to remedy the present plight: To increase markets by stimulating old uses and finding new ones and by increasing efficiency in order to lower costs. Organized safety measures, when intelligently entered into with broad humanitarian objectives foremost, always result in increased operating efficiency and a money saving both to workers and the employing company, Mr. Curtis pointed out.

Safety in Electrical Work

The first technical safety paper on the program was an address entitled, "Safety and the Electrical Ground," by J. M. Dodds, engineer with the General Electric Co. at San Francisco. Mr. Dodds discussed the human body as an electrical conductor, pointing out that nine-tenths of the resistance of the body was in the skin and that the normal resistance is greatly reduced in contact with moisture and augmented if the skin be dry. He went on to explain the security from shock secured by effective grounding and demonstrated how an effective electrical conductor in parallel with the body would prevent passage of current through the latter.

Mr. Dodds recommended the prone pressure method of resuscitation as the most effective for use after electric shock and pointed out the necessity for constant practice in order that first-aid men be able to administer it efficiently. Subsequent discussion developed that even though metal parts capable of conducting current are joined together electrically and well-grounded, habitual inspection and test are necessary to assure a safe ground. This was pointed out as of utmost importance, as men depend on "grounds" for their protection and may be led into great danger if the supposed grounds do not actually exist.

Safety in Handling Explosives

Harry F. Kalb, explosives engineer for the Hercules Powder Co., talked on "Transportation of Explosives" and said that although American railroads had safely transported 500,000,000 lb. of explosives during the last five years, the rapid increase in truck haulage of powder, dynamite, caps, etc., was giving the manufacturers a great deal of concern. The relatively greater security in transporting explosives by railroad is largely behind the move now being made to reduce rail rates for these commodities, in order to meet truck competition.

Mr. Kalb made a number of suggestions for the safe movement of explosives by truck, drawn largely from experience gained by the explosives manufacturers. A number of the more important suggestions follow:

Truck used for carrying explosives should have no steel or iron nails or parts about the body, brass nails and parts being substituted.

A gasoline valve should be provided which is so located that the driver can shut off the gasoline line without removing floor boards or raising hood.

Preferably, there should be no pan under the engine, but if pan is used it should be slotted to prevent accumulation of oil or gas, a very appreciable fire hazard.

Only electric lights should be used.

Tail light should be wired in series with

the dash lamp as an indicator to the driver.

Both generator and storage battery should be provided, to insure lights in case of engine trouble.

Two fire extinguishers of the tetrachloride type should be installed in truck cab.

The load should be covered with fire-resisting tarpaulin.

The truck should be equipped with mirror, horn, front bumpers and speedometer.

A sign reading "Explosives, Dangerous," in white letters at least 3 in. high on red background should be placed on each side of body and on the tail gate.

A red flag, not less than 24 in. square, with white letters 6 in. high, reading "Explosives, Dangerous," should also be displayed from the truck.

The truck should be kept in first class mechanical condition.

It is very important that batteries and wiring are so located that neither can come into contact with explosives package. Wiring should be completely protected and securely fastened. The insulation should be inspected frequently.

The truck floor should be tight and the sides and ends high, to prevent any possibility of packages bouncing out.

Any inside metal parts should be covered with wood.

Blasting caps or other detonators should never be hauled in the same load as powder or dynamite.

No metal articles, metal tools, oil matches, firearms, storage batteries or similar materials should be hauled in the body or bed of a truck carrying explosives.

Trucks carrying explosives should never be loaded to exceed the rated capacity.

No trailers should be employed in such hauling.

A full stop should be made at all railroad crossings.

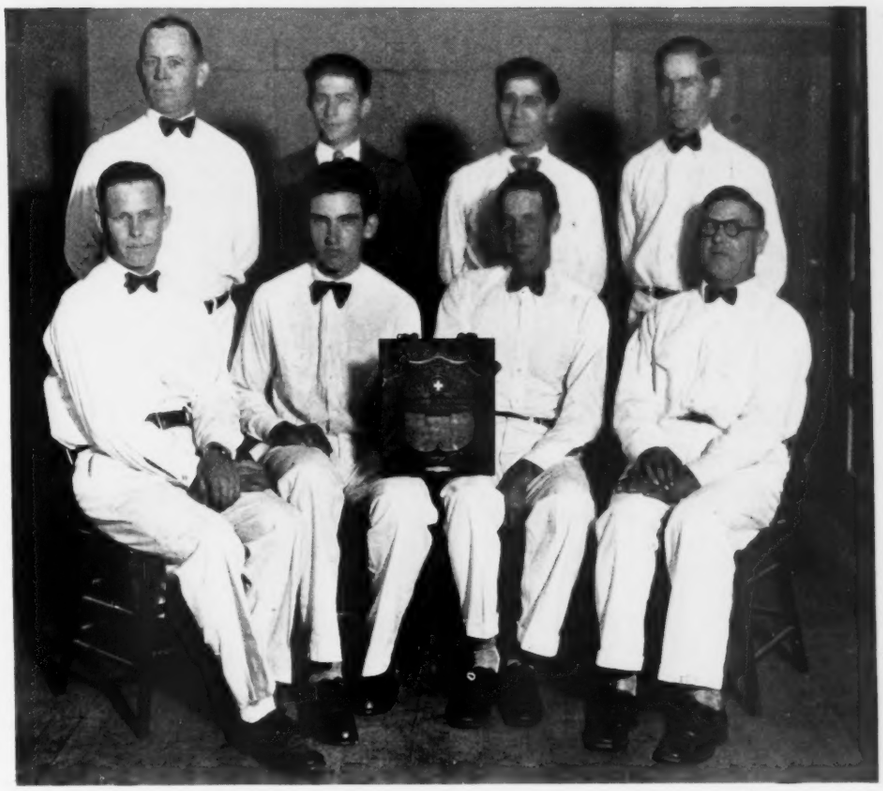
Trucks carrying explosives should never be parked on city streets. Driver should stop for meals outside of town.

Explosives must never be unloaded except to place immediately in magazine or deliver into the hands of someone duly authorized to receive.

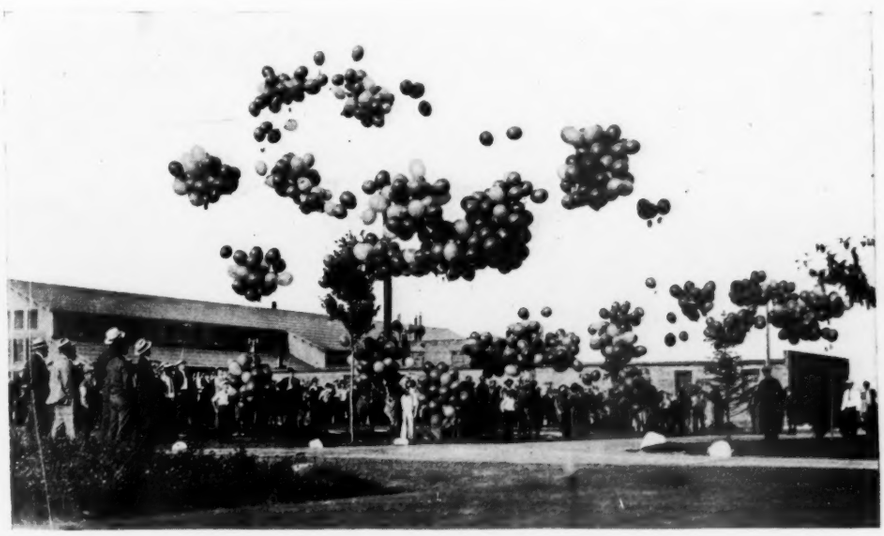
Packages of explosives should never be piled directly behind engine exhaust.

Truck engine should be stopped and brakes set while loading and unloading.

Mr. Kalb described several accidents or narrow escapes following the disregard of one or more of the above suggestions, but knew of no accidents where these suggestions had been followed.



Members of the Superior Portland Cement, Inc., first-aid team which won first place at the safety meeting in Seattle. Front row, left to right: Walter Jungblom, captain; Blake Hall, substitute; Ed Holbert, Jr., and Frank Cinq-Mars; rear row: Carl Jungblom; Howard Carleton, coach; John Bitonti, and Oscar Haussler, patient



Gas balloons, 955 in number, to emphasize the 955 days of safety preceding its trophy rededication, carried news of the Universal Atlas safety record westward from Duluth across the state. The balloon traveling farthest won a prize of $25 for George Lewis of Anoka, Minn., 126 miles away, and a $5 prize for Henry C. Anderson, employe at the plant, whose name was on the announcement tag it carried

Other speakers during the morning session were C. F. Fry, superintendent of safety, Industrial Commission of California, and Robert A. Kinzie, mining engineer and consulting engineer for the Santa Cruz Portland Cement Co. J. E. Jellick, manager of advertising and promotion of the Calaveras Cement Co., served as the luncheon chairman. Several congratulatory telegrams from persons prominent in the industry and from others were read with applause. A splendid luncheon entertainment was provided, after which the afternoon session convened.

Afternoon Session

A spirited round-table discussion of current mill and quarry safety problems was the first feature of the afternoon program. W. H. George, secretary and general manager of the Cowell Portland Cement Co., presided and from his close personal contact with safety matters over a long period of years was able to direct the discussion along many helpful lines. At the close of the discussion the assemblage moved to the grand ballroom of the hotel, where the first-aid contest was in preparation.

The contest, which was the second between the teams of the California mills, was directed by A. W. Bullard of E. D. Bullard and Co., San Francisco, assisted by members of the California Society of Safety Engineers. The three teams contesting were

those representing the Cowell mill at Cowell, the Pacific mill at Redwood City and the Santa Cruz mill at Davenport.

The team representing the Pacific Portland Cement Co. won and the award of a $20 gold piece was made to each member of the team. Second place went to the team of the Santa Cruz Portland Cement Co., which was awarded a silver cup. The Cowell team, which was the winner of the previous contest, dropped to third place, but has promised to resume its old position next year.

The annual safety dinner of the California mills, held that evening, proved a most enjoyable affair. J. H. Colton, vice-president of the Pacific Portland Cement Co., was toastmaster and the speakers were Mr. Curtis and Hon. Will J. French, director of the department of industrial relations, State of California, who for many years has been an outstanding friend of the cement industry in its efforts to eliminate accidents. A fine musical program was arranged. Cement executives declared the meeting one of the most interesting and helpful held in California.

Utah and Idaho Cement Men Meet

Successful Safety Meeting Discusses Plans for Curtailing Mishaps

CEMENT PLANTS of Utah and Idaho held their second annual safety meeting at Hotel Bigelow, Ogden, Utah, under the auspices of the Portland Cement Association, September 25.

The meeting, which was considered an improvement over any former meeting of the operating men of the district, was arranged entirely by the local committee, consisting of R. R. Dorland, superintendent of the Union Portland Cement Co. plant at Devils Slide, Utah, who acted as chairman, and O. C. Hart, superintendent of the Utah-Idaho plant at Brigham City; L. E. Howard, chief clerk, Utah-Idaho Cement Co.; Victor Williams, chief clerk, Union Portland Cement Co., and J. B. Maxfield, vice-president of the Idaho Portland Cement Co.

The program was as follows:

MORNING SESSION

R. R. Dorland (Union), chairman

Safety Progress in the Cement Industry—A. J. R. Curtis, Portland Cement Association, Chicago.

Good Housekeeping and Plant Safety—Victor Williams, chief clerk, Union Portland Cement Co., Devils Slide, Utah.

State Compensation and How It Is Administered—G. Y. Yearsley, Utah State Industrial Commission, Salt Lake City.

Protecting and Treating the Eye—L. D. Mahannah, M.D., Brigham City, Utah.

LUNCHEON

(In Ogden Chamber of Commerce dining room)

A. H. Chambers, Union Portland Cement Co., Ogden, presiding.

Address by H. Peterson, explosives engineer, Hercules Powder Co., on "Avoiding Accidents with Explosives," illustrated with films.

AFTERNOON SESSION

O. C. Hart (Utah-Idaho), chairman

"Safety"—C. T. Bailey, safety engineer, Oregon Short Line Railroad Co., Salt Lake City.

First-aid discussion and demonstration, conducted by W. W. Kessler, foreman miner, U. S. Bureau of Mines, Salt Lake City, assisted by Traffic Officer Thomas F. Dee, captain of the prize-winning first-aid team of the Salt Lake City police department.

Round-table discussion of mill safety problems, conducted by O. C. Hart:

Burning Department, led by E. D. Brumley, general foreman (Union), and Adoph Bott, burner (Utah-Idaho).

Coal Grinding, led by M. E. Olson (Utah-Idaho), and C. W. Nielson, shift foreman (Union).

Packing, Shipping and Cement Storage, led by Francis Bray, shipping clerk (Union).

Shops, led by N. H. Norr, blacksmith (Utah-Idaho); Charles Weed, machinist (Utah-Idaho); Ross Robinson, carpenter foreman (Union), and Daniel Summers, boiler maker (Union).

Electrical, led by George Hansen, chief electrician (Union), and W. S. Chrysler, chief electrician (Utah-Idaho).

Yards and Railroad, led by Andrew Peterson, yard foreman (Utah-Idaho), and L. S. Bell, shift foreman (Union).

General Safety Subjects, led by J. J. Connell, storekeeper (Union), and A. L. Hansen, storekeeper (Utah-Idaho).

DINNER

Toastmaster, O. C. Hart

Speakers—Harold C. Day, vice-president, Utah-Idaho Cement Co.; F. H. Richardson, district engineer, Portland Cement Association, Salt Lake City; Dr. H. T. Plumb, district engineer, General Electric Co., Salt Lake City.

All of the sessions were spirited, running over allotted time and indicating general progress of the safety movement among the mill organizations represented. The report made from the records of the Portland Cement Association indicated that all of the local mills had greatly reduced accidents since the last meeting, a year ago, and predictions were freely ventured that an association trophy or two would be coming to the local plants next year.

The Registration at Ogden

Idaho Portland Cement Co., Inkom, Idaho—E. A. Dufford, sales; J. L. Houge, master mechanic, and H. G. Hubbard, superintendent.

Union Portland Cement Co., Devils Slide, Utah—L. S. Bell, shift boss; Francis E. Bray, shipping clerk; E. D. Brimley, general foreman; A. H. Chambers, salesman; J. J. Connell, storekeeper; R. R. Dorland, superintendent; George Hansen, electrician; John Hopkins, quarry foreman; L. D. Mahannah, physician; C. W. Nielson, shift foreman; Roscoe B. Robison, carpenter foreman; Dan Summers, boilermaker; John Summers, shift boss, and V. T. Williams, chief clerk.

Utah Idaho Cement Co., Brigham City, Utah—A. Bott, burner; Walter S. Chrysler, chief electrician; H. C. Day, vice-president; W. G. Dor, master mechanic; A. L. Hansen, storekeeper; O. C. Hart, superintendent; L. E. Howard, chief clerk; Victor Nelsen, dry grinder; L. H. Nørr, blacksmith; Marvin E. Olsen, repairman; Andrew Peterson, yard foreman; C. H. Peterson, repair and shovel man; D. H. Stokes, chief packer; H. R. Summers, head burner, and Charles Weed, machinist.

Miscellaneous—C. T. Bailey, safety engineer, Oregon Short Line Railroad Co.; A. J. R. Curtis, assistant to general manager, Portland Cement Association; Thomas W. Dee, motor patrol, police department, Salt Lake City; W. W. Kessler, foreman miner, U. S. Bureau of Mines; H. Peterson, explosives engineer, Hercules Powder Co.; H. T. Plumb, district engineer, General Electric Co.; F. H. Richardson, district engineer, Portland Cement Association, and G. R. Yearsley, safety engineer, State Insurance Fund.

Representatives of cement mills in Oregon, Washington and British Columbia hold Northwest Regional Safety meeting at Seattle, Wash., which was reported in our last issue

Southern California Celebrates at Victorville

EXTRAORDINARY in almost every respect accurately describes the ceremonies on Saturday, September 20, at the Victorville, Calif., mill of the Southwestern Portland Cement Co., when the 1929 safety trophy of the Portland Cement Association was dedicated and unveiled. The mill and surrounding park, always kept scrupulously clean, were decorated for the occasion with hundreds of flags and vari-colored electric lights; bandstand, hundreds of terrraced seats, full barbeque equipment, picnic tables and other arrangements for a full-fledged gala celebration were in readiness as the hour for the festivities approached.

Many prominent guests and visitors came from Los Angeles, San Francisco and more distant points. These assembled at the mill club house at noon for a buffet lunch with company and plant officials. Included in the official party were Calvin C. Merrill, vice-president and general manager; M. A. Koffman, secretary; T. K. Partridge, sales manager; W. C. Rieth, chief engineer, and L. V. Robinson, superintendent of the Victorville plant. Frank H. Powell, president of the company, was detained in the east and unable to be present, but Mrs. Powell and a friend, Mrs. Dwight Baur of Los Angeles, graciously occupied places of honor and remained throughout the ceremonies.

Harry Sergeant, safety supervisor of the Victorville plant, called the meeting to order and after the usual preliminaries introduced as the master of ceremonies M. A. Koffman, secretary of the company, and amid applause well bespeaking his popularity at the plant, Mr. Koffman took charge of the meeting.

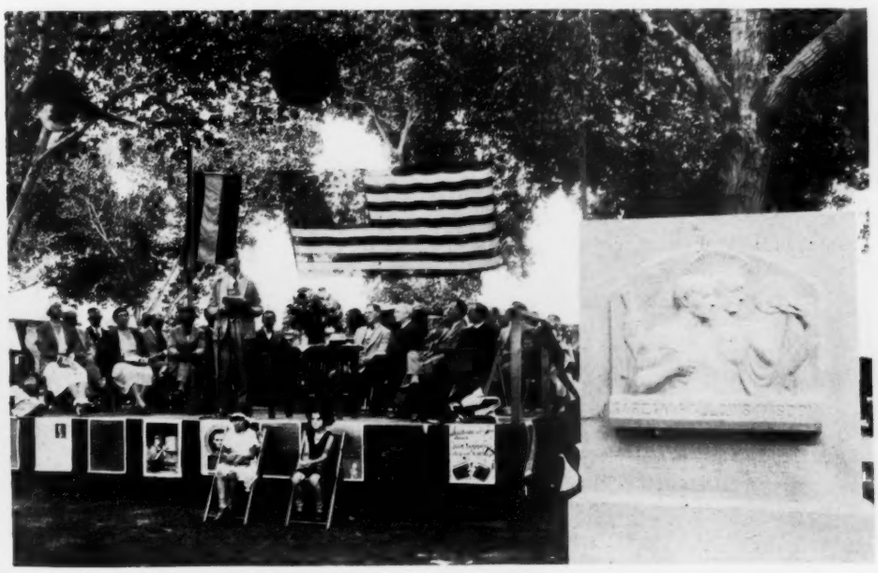
Carl Leonardt, founder

Mr. Koffman referred fittingly to that outstanding character Carl Leonardt, founder of the company, who, although absent in the flesh, was undoubtedly present in spirit. Telegrams received from President Powell, J. B. John, chairman of the committee on accident prevention of the Portland Cement Association; W. T. Groner, superintendent of the Osborn, Ohio plant of the company; N. E. Nichols, superintendent of the El Paso, Texas, plant and many others, were read and appreciated.

A. J. R. Curtis paid high tribute to Carl Leonardt as a constructive leader, one whose ideals for his company, his employes and his plants were of the highest, whose wise foresight and high construction standards doubtless "built out" many accidents which might otherwise have occurred to his men, and one who was willing to spend wherever necessary and anxious to help his organization at every opportunity in order to banish personal injury and death from his mills.

Mr. Curtis read the very enviable record of the Victorville mill during the past four or five years and held it up as an example from which any group of workmen could gather inspiration. In 1926 there were 57 lost-time accidents and one fatal accident at Victorville, notwithstanding very earnest efforts made for their elimination. At the end of 1927 the total for that year stood at 36 mishaps causing loss of time, and the absence of fatalities during the year was happily received as an indication of real progress. During 1928 the accident record was again improved to such a remarkable extent that only four lost-time accidents were recorded. The year 1929 capped the climax, of course, with a record free from accidents of any recordable classification. No time was lost by workmen, no employes maimed in any way, and no fatalities.

On behalf of the employes of the Victorville plant, William Montgomery, a member of the repair department, accepted the trophy. W. A. Chowan, manager of the California Inspection and Rating Bureau, spoke on the influence of the wife on the safety of her husband. Other brief speakers were H. G. Jacobsen of Chicago, formerly manager of the Bureau of Accident Prevention and Insurance of the Portland Cement Association, and Superintendent L. V. Robinson of the Victorville plant. Hearty and prolonged applause broke forth throughout the assemblage of several hundred persons when Mr. Koffman called upon C. C. Merrill, vice-president and general manager, who modestly declined several invitations to speak. The mill celebration was concluded with a grand barbeque in the plant park near the club house, approximately 600 persons partaking of the excellent meal. Later in the evening most of the mill employes and many of the guests attended a grand fiesta on the Ossler ranch a few miles distant, closing one of the most pleasant mill celebrations yet held among the cement manufacturing organizations.



Scene at Victorville, Calif., unveiling and dedication of Southwestern Portland Cement Co.'s safety trophy. At the "mike" is M. A. Koffman, secretary, master of ceremonies. From left to right, Mrs. F. H. Powell, Mrs. Dwight Baur, William Montgomery, Harry Sargeant, safety supervisor, in light suit, A. J. R. Curtis, R. L. Wiley and Father P. J. Murphy

U. S. Gypsum Warehouse

UTICA, N. Y., has been selected as the northern New York wholesale distributing point of the United States Gypsum Co., which has leased a portion of the yard and warehouse of E. S. Campion Co., Inc., New Hartford, to serve the territory between Syracuse, Albany, Binghamton and Watertown.—*Utica* (N. Y.) *Press.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

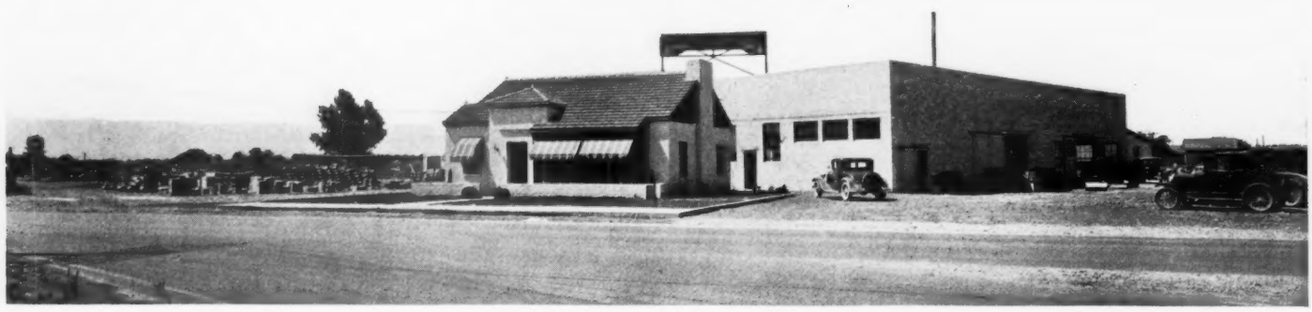


Fig. 2. General view of the Yakima plant

Modernizing a Concrete Products Plant

By F. K. Haskell

THE YAKIMA CEMENT Products Co., Yakima, Wash., which has been a factor in the business activity of the fertile Yakima valley for a number of years, has been entirely remodeled by W. P. Hews, manager, and J. R. Sherman, secretary-treasurer of the company, who have built an ideal plant constructed entirely of concrete, a monument to the business in the Pacific Northwest.

The plant and storage yard cover approximately five acres and are supplied by two railroad spurs, one leading into the center of the storage yard and the other into the plant. The spur in the storage yard is depressed so that the car floor is level with the yard, making it possible to load trucks or cars efficiently.

The entire plant is constructed of 8-in. Hollowstone concrete building tile with concrete floors throughout. A metallic hardener was used on most of the floors to provide durable wearing surface.

Office Building Attractive

The office building, shown in Figs. 1, 2 and 4, is constructed of Hollowstone concrete tile for the exterior walls, and painted with a cream-colored cold water paint, making it very attractive in appearance. The main entrance to the office is finished with cast stone and the roof is of concrete building tile colored red. The interior is divided into three small offices with one large room in the center which is utilized for a salesroom. Special attention was paid to planting grass and shrubs and construction of flagstone walks around the building to make it as attractive as possible.

The Main Plant

The main building is 134 ft. wide and 153 ft. long. In addition to the main plant is a building for storing cement, which is 40 ft. by 48 ft., and is shown at the right in Fig. 3. In the right end of the building shown in Fig. 2 is located the machine shop, warehouse and locker room containing lavatory and showers for the workmen. On the left end of the building, Fig. 4, is located the steam kilns, with the section in the center housing the machinery for making pipe, hollow tile, and other cement products.

Through the central portion of the building, sand and gravel storage bunkers were built, as can be seen in Fig. 3. The top of the bunkers are 22 ft. above the ground and have a capacity of approximately 325 cu. yd. They are designed so that material may be drawn from the side through chutes with segmental gates for use in the mixture, or through roller gates in the bottom of the bunkers.

In the operation of the plant, bag cement is received in carload lots and unloaded directly into the cement warehouse, Fig. 5. The cement is loaded on 4- by 4-ft. jack lift platforms carrying 36 to 40 sacks. These platforms are moved into the warehouse or directly to the main floor of the plant near the mixer by the use of the jack lifts, the cement being allowed to stay on these platforms until it is used. The sand and gravel is delivered by truck from commercial plants and dumped directly into the bunkers, there being a ramp built on a 15% grade to make this possible. A portion of this ramp is shown in Fig. 3.

Fig. 4. Part of storage yard, steam kilns at the left

Mixing the Materials

All mixers for the tile and pipe machines are located below the floor of the main plant. Two-wheeled measuring carts are used to transport the material taken out of the storage bunkers to the mixers. The concrete is then elevated to the feed hoppers with skips having a capacity of approximately 5 cu. ft. From the hopper it is fed into the machine in the usual manner. The finished product is then transported, in the case of pipe, by regular off-bearing cars into the steam kilns.

There are 12 kilns. Eleven are 9 ft. wide, 60 ft. long, and 6 ft. high at the eaves. The one large kiln, which can be seen at the extreme left in Fig. 4, is 18 ft. wide and 24 ft. high. This kiln has a 5-ton traveling crane to handle large pipe. The pipe in this kiln is steamed by the use of a canvas jacket.

The steam kilns are constructed with cinder concrete roofs and have sliding doors. Small pits filled with water are located on the floor of each kiln and steam is piped to these pits where it is released through small holes in the pipe and passed up through the water. The kilns also are designed with sprinkling systems operated by valves from the face of the kiln. Steam is furnished by a 40-hp. low-pressure boiler using oil for fuel. Oil is received in carload lots and stored in a 12,000-gallon concrete tank below the floor of the machine shop.

The tile from the Holostone tile machine is delivered directly on to ball bearing gravity roller conveyors and transported to the storage yard where it is cured by a sprinkling system. Water is furnished to the entire plant and storage yard from a well encased with concrete pipe, using a small centrifugal pump. Well water is used because city water is not available in the quantities desired without the construction of new mains.

All machinery in the entire plant is motor driven, using individual motors for each piece of machinery.

The general arrangement of the pipe machines is shown in Fig. 5. In the plant at the present time, pipe from 3 in. to 36 in. is made by machinery. Pipe larger than 36 in. in diameter is poured, using a vibrator for compacting. This vibrator consists of a steel platform supported at the four corners by heavy castings embedded in hard rubber. The vibratory action is secured through a shaft running at high speed and attached to the platform, the shaft having an eccentric weight. This method produces an unusually dense product. The pipe from the vibrator is picked up by a traveling crane and placed in the large kiln.

Fig. 5. General arrangement of pipe machines

Fig. 1. Office of Yakima Products Co.

In the products plant proper, a ready-mixed concrete plant has been installed, the location of which is shown in Fig. 3. Below the sand and gravel bunkers is a batcher on platform scales. The material is chuted directly from the bunkers into a weighing hopper which serves a ½-yd. concrete mixer. The mixture is then elevated by a skip to a hopper located high enough to permit dumping of the concrete into trucks. This outside hopper can be seen in the center of Fig. 3. From here the concrete is delivered to the job in 2-yd. lots by trucks equipped with bath-tub type bodies. The capacity of this plant is approximately 12 cu. yd. per hour and is operated by two men.

In designing the plant special attention was given to the handling of materials, both the raw and finished product, keeping in mind the flow of production. After the sand and gravel is delivered to the bunkers it is transported to the mixers located only eight feet away. The material passes from the mixer to the machines, from machines to kilns, from the kilns directly out into the storage yard and from the storage yard into cars or trucks using the depressed track.

Lighting of the entire plant has been effectively taken care of by the incorporation of the saw-tooth type of roof.

Fig. 3. Rear view of the plant, showing ramp for loading sand and gravel bunkers

Ready-Mix Plant Projected at Waterbury, Conn.

ESTABLISHMENT of a concrete mixing plant in Waterbury, Conn., is now under consideration with several of the local leading dealers in masons' supplies already agreed on the plans, it was announced recently. When established the concern will probably be known as the Waterbury Ready Mixed Concrete Co. and will be incorporated for about $150,000.

When plans are completed this city will have a concrete mixing plant that will eliminate the necessity of hunting around for contractors, mixing machines, cement and sand. Already Chatfield and Chatfield, Inc., the Tracy Brothers Co., the Waterbury Mason Supply D'Aurio Co. and J. E. Smith Coal Co., Barbara and Co. have agreed to enter the venture. Others will probably be asked to join.—*Waterbury* (Cn.) *Democrat.*

Building Material Advertising Ahead of 1929

EXPENDITURES of $8,993,505 were made for building material advertising during the past nine months of 1930 in national magazines, national farm magazines and for radio broadcasting, an increase of $497,430 over the $8,496,075 which was spent during the same period in 1929. This increase represents a 5.85% increase for the nine months of 1930 over the nine months of 1929, according to the Business Survey Department of Dorrance, Sullivan & Company, New York advertising agents.

The accumulative total for the nine months of 1930 in national magazines was $8,012,472 as against $7,854,971 during the same period of 1929, a gain of slightly over 2%. The accumulative total for building material advertising in national farm magazines for the nine months of 1930 was $518,841 as against $503,538 during the same period in 1929, a gain of 3.3%. The accumulative total for radio broadcasting for the same period in 1930 was $462,192 as compared to $137,566 during the same period of 1929 which was a gain of 235%.

Building material advertising in September national magazines, national farm magazines and for radio broadcasting amounted to $910,872, a loss of $105,325 over the September, 1929 figure of $1,016,197, or approximately 10%.

In national magazines for the month of September 1930 advertisers spent $806,122 as compared with $928,347 in September, 1929 which was a loss of approximately 13%.

National farm magazine building material advertising in September, 1930 was $69,157, a loss of $3,393 over the September, 1929 total of $72,550, or approximately 4%.

Radio broadcast advertising during this period in 1930 amounted to $35,593 as compared with expenditures of $15,300 in 1929, a gain of approximately 132%.

Sand-Lime Brick Production and Shipments in September

THE following data are compiled from reports received direct from 20 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is one less than those furnishing statistics for the August estimate, published in the September 13 issue. The statistics below may be regarded as representative of the entire industry in the United States and Canada.

While the number of plants reporting in September is less than in the previous month, it is estimated that production remains about the same. There is an increase in shipments by rail and truck, however. Stocks on hand decreased somewhat, while the amount of unfilled orders has increased.

The following are average prices quoted for sand-lime brick in September:

Average Prices for September

Shipping point	Plant price	Delivered
Atlantic City, N. J.	$11.00	$16.00
Boston, Mass.	11.00	13.00
Dayton, Ohio	12.00	15.00
Detroit, Mich.	12.00 @ 13.00	15.50
Detroit, Mich.	13.00	14.50
Flint, Mich.	11.00	.....
Grand Rapids, Mich.	14.00	.....
Iona, N. J.	10.50 @ 12.00	14.50
Jackson, Mich.	13.00	.....
Milwaukee, Wis.	9.50	13.00
Minneapolis, Minn.	.....	9.00
Mishawaka, Ind.	11.00	.....
Pontiac, Mich.	13.00	.....
Saginaw, Mich.	12.00	.....
Syracuse, N. Y.	18.00	20.00
Toronto, Can.	11.00	13.00
Winchester, Mass.	.....	14.00

The following statistics are compiled from data received direct from 20 producers of sand-lime brick in the United States and Canada:

Statistics for August and September

	†August	*September
Production	9,635,660	7,877,367
Shipments (rail)	2,920,573	3,278,470
Shipments (truck)	6,436,615	6,460,502
Stocks	15,495,599	13,907,947
Unfilled orders	7,761,500	8,957,000

†Twenty-one plants reporting. Incomplete, eight plants not reporting unfilled orders.

*Twenty plants reporting. Incomplete, two plants not reporting production, one not reporting stocks on hand, and five not reporting unfilled orders.

Notes from Producers

Boice Bros., Pontiac, Mich., report that they are supplying brick for the Detroit Edison warehouse at Pontiac and the Linden School at Linden, Mich.

Jackson Brick Co., Jackson, Mich., is furnishing the brick for the New Merchant Bank building at Battle Creek, Mich., and the Theatre building at Charlotte, Mich.

Sand-lime brick for several new Detroit city schools and for the St. Clair county warehouse in Port Huron, Mich., is being supplied by the Sand-Lime Products Co., Detroit, Mich.

Los Angeles Sand and Gravel Concerns Consolidating

ANNOUNCEMENT was made recently by Fred M. McAvoy, president and manager of the Concrete Materials Corp., 11251 Sherman way, North Hollywood, Calif., of the sale of the plant to one of the large rock corporations now operating in the valley.

With the sale of this plant there now exists only one other independent rock and gravel company in the valley, that belonging to Walter Stein.

As a result of recent consolidations it is reported that the price of gravel and sand has advanced from $1.10 a ton to $1.30.

According to present plans, Mr. McAvoy, who is also president of the Kiwanis Club, will take a motor trip in company with his family to Canada and return before considering other business enterprises.—*North Hollywood* (Calif.) *Press.*

East Tennessee Business Said to Be Good

LAST FALL the business depression had operations at Volunteer Portland Cement Co., Knoxville, Tenn., plant down to 50% below normal, and now the plant has climbed back to within 10% of capacity production, Manager Lewis said recently.

"We are turning out 2600 bbl. of cement daily and expect a good winter buisness if bad weather doesn't hamper construction activity more than usual," Mr. Lewis said.

The Volunteer plant has 20 new safety and first-aid experts on its staff, the fruits of an educational program which it has just completed. John Mowery, a U. S. Mines Bureau expert, spent two days each week last month instructing Vounteer employes in first-aid.—*Knoxville* (Tenn.) *News-Sentinel.*

Missouri Quarry Makes Special Agricultural Limestone Offer

THE Blackwater Stone Co. of Columbia, Mo., is making the farmers of Cole and surrounding counties an unusual offer at this time in that they may secure limestone now and have until December 1, 1931 to pay for the order without interest. They need only pay for the freight on the shipment at once.

The company is making this commendable offer in order to aid the farmers who have been hard hit by the summer drouth.

The plan is meeting with the approval of those connected with farm relief in Cole county.—*Jefferson City* (Mo.) *News.*

Dimension Stone Quarrymen Hold Rate Conference

THE National Association of Stone, Marble and Granite Producers met at Asheville, N. C., recently to consider a proposed adjustment of freight rates on these products in the eastern half of the United States.

Another Mississippi Cement Project Announced

"WE BELIEVE we have an ideal location for a cement plant," said Ralph T. Miller, of Nashville, Tenn., president and general manager of the Yazoo Portland Cement Co., recently, at Vicksburg, Miss., according to the *Vicksburg Herald*. He announced that his company would construct a cement plant here north of the city.

"A few years ago water transportation meant nothing to the manufacturer of cement. It could not be shipped on water, as the dampness would cause the sacked cement to harden on the outside for a fraction of an inch. A man named Fuller, however, discovered a method which has made it possible to ship cement on the river. It is put loose into a steel compartment. During the first shipment a crust of cement will harden on the steel, but after that the compartment can be used without the loss of a pound of cement. The cement is pulled from the compartments by a vacuum pump. So you see why a cement plant at Vicksburg on the river is a big advantage. Especially is this so when the cement is above the river on a hill and can be let down. In most cement plants the rock is raised from the ground," concluded Mr. Miller.

The charter for the Yazoo Portland Cement Co. to operate in the state was secured in Jackson Monday.

Besides Mr. Miller other officials of the company are St. George T. Cordell, also of Nashville, secretary and treasurer; G. I. Frazier, of Memphis, president of the G. I. Frazier Co., Tennessee; Galvin Hudson, president Hudson and Dugger Co., directors.

Options on approximate 50 acres of land north of the city have been secured by the company for the location of the plant. The properties under option are those owned by the Dornbusch estate and Mrs. M. King and J. Seale Keefe. The properties have a frontage of 700 ft. on the Yazoo canal with full riparian rights.

An adequate supply of suitable raw materials for the manufacture property has proven up, Mr. Miller states, sufficient to supply 3000 bbl. daily for 35 years.

In regards to the type of plant which the Yazoo Portland Cement Co. will have in Vicksburg, Mr. Miller stated the plant will have a rated capacity of 1,000,000 bbl. per year and will be modern in every particular, using natural gas for fuel. Slurry filters for dewatering the slurry, waste-heat boilers to utilize the waste heat from kilns for power generation to operate the machinery in the plant; wet process to insure uniformity of quality. The cost of production will be as low as any of the modern cement plants in the United States and will be designed to operate with minimum man hours per barrel.

The management of the plant will be under the supervision of Ralph T. Miller, who was with the Pittsburgh Testing Laboratory for 20 years in charge of their cement department, and who promoted, designed and built the Hermitage Portland Cement Co. at Nashville, Tenn., and operated it as general manager for two years and who designed and built and assisted in the promotion of the Cumberland Portland Cement Co. at Cowan, Tenn., and was vice-president and manager for two years.

Mr. Miller and Mr. Cordell, who is also in Vicksburg, were both high in their praise of the excellent co-operation afforded them in locating in Vicksburg by Mayor W. J. Hossley, P. L. Hennessey and Bro. and the local chamber of commerce.

In speaking of the coming of the Yazoo Portland Cement Co. to Vicksburg, W. N. Miner, secretary-manager of the Vicksburg Chamber of Commerce, said: "The Chamber of Commerce is well pleased with the decision of Mr. Miller to construct a plant here in Vicksburg.

"The local commerce body feels that there is an excellent opportunity for the successful operation of such a plant in this city and have never given up the thought, since the first interest in this matter was shown over a year ago, that eventually some reliable concern would become interested."

Macon, Miss., Chamber of Commerce Asked to Buy Cement Stock

WHETHER the million dollar plant of the Mississippi Portland Cement Co. is to be located in Macon depends upon the ratification of the local Chamber of Commerce of plans and statements of the company, it was decided at a special meeting of the Chamber of Commerce recently.

At the meeting, W. S. Guest and T. J. Davis, representing the recently chartered company, appeared before the chamber.

They were asked to submit a detailed financial statement and other statements showing the exact cost and specifications of the plant to the Chamber of Commerce within the near future.

As the city has been asked to purchase $50,000 in stock of the company before it will locate here, it was thought best to ask for statements to be checked over.

The statements are to be turned over to a competent engineer to be engaged by the Chamber of Commerce.

Upon the outcome of the statements and the recommendations of the engineer rest the hopes of Macon for securing the big plant.

It was explained that local people want to know exactly what they are getting for the $50,000 in stock.

Reports were presented at the meeting from B. R. Alford, engineer of the company, saying that his analysis of samples of lime rock taken from near Macon tests 100%.

If no hitch occurs in plans of the company and if the Chamber of Commerce approves the report to be submitted, the big plant will be located here.—*West Point* (Miss.) *Leader*.

Improvements at Missouri Portland Cement Co.'s Gravel Plant

IMPROVEMENTS already finished and to be made to the sand and gravel plant of Missouri Portland Cement Co., at 1904 Chelsea, Memphis, Tenn., this fall and winter will cost close to $100,000.

Most of the work already has been completed. The largest item in the expenditures in improvements is on the boat which pumps the sand and gravel into barges from the lake covering approximately 62 acres. A 450-hp. oil engine costing $40,000 has been installed on this boat, replacing a 500-hp. steam-power plant.

The boat itself represents an investment of $83,000. It is capable of mining with its 15-in. centrifugal pump between 160 and 175 cu. yd. of sand and gravel per hour. This gravel has been brought up from as great a depth as 63 ft. End of the marketable material is reached at that depth. Other places in the lake range from 14 to 48 ft. deep.

Sand and gravel mined is carried to the plant in a barge, where it is lifted by a clamshell of 3-yd. capacity to a belt 30 in. wide, which takes the sand and gravel to the screening plant, where it is washed and screened into four different kinds of gravel and three different sizes of sand.

It is then placed in storage. Materials for the wholesale trade are taken from these storage places, while the Memphis retail trade is served out of hoppers near the screening plant.

While one barge is being unloaded another the same size is pushed out and loaded while the other is being unloaded.

These barges are capable of hauling 21 cars of material at a time. Each costs $33,000 and is so large they had to be built at the plant after material had been shipped in.

The company has just spent $18,000 changing the power which unloads the barges from steam to electricity.

The next work will be on a screening plant which, says J. C. Wilkinson, plant superintendent, will permit closer grading of sand and gravel and better washing.

"We are making this change primarily because state highway departments are becoming more rigid in their requirements for sizes in gravel," says Mr. Wilkinson.

Even though the changes are under way, they are not a handicap to business. While the usual storage of sand and gravel on the grounds is from 65,000 to 70,000 tons, at present there are 100,000 tons ready.

The company has its own locomotives to push cars over its own trackage hundreds of feet in length. It also has two locomotive cranes to load sand and gravel on cars.

Mr. Wilkinson says Memphis is fortunate in having a white sand in this section which cannot be found just anywhere in the world, and which is as good as that found anywhere.—*Memphis* (Tenn.) *Press and News*.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, N. J.		.65	1.25	1.25	1.15	1.15
Attica and Franklinville, N. Y. (a)	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.25	1.15	1.75		1.75	1.75
Buffalo, N. Y.		1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.65	.95	1.25	1.25		
Leeds Jct., Me., and Milton, N. H.		.50	1.75	1.75	1.25	1.00
Machias Junction, N. Y.	.75	.75			.75	.75
Montoursville, Penn.	1.00	.75	.75	.60	.40	.40
Northern New Jersey	.18– .50	.18– .50	.50–1.25	.50–1.25	.50–1.25	
Scarboro, Me.		1.00	2.25	2.25	2.00	2.00
Washington, D. C.	.55	.55	1.00	1.00	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.30	.20	.20	.35	.35	.40
Attica, Ind.			All sizes .75–.85			
Barton, Wis.		.40	.50	.60	.60	.60
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Des Moines, Iowa	.40– .70	.40– .70	1.50–1.85	1.50–1.85	1.50–1.85	1.50–1.85
Dresden, Ohio		.60	.70– .80	.75	.75	.70
Eau Claire, Wis.		.40	.50	.85	.85	
Elkhart Lake and Glenbeulah, Wis.	.50	.30	.40	.50	.50	.50
Grand Rapids, Mich.	.40	.40	.70	.70	.70	.70
Greenville, Ohio	.50– .70	.40– .60	.50– .60	.50– .60	.50– .60	.50– .60
Hamilton, Ohio	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75	.65– .75
Hersey, Mich.	.50			.60	.70	.70
Indianapolis, Ind.	.50– .60	.25– .60	.40– .60	.45– .75	.45– .75	.45– .75
Kalamazoo, Mich.		.40– .50		.45– .55		.50– .75
Kansas City, Mo.	.70	.70		.80		
Mankato, Minn.	.55	.45	1.25	1.25	1.25	
Mason City, Iowa	.60	.60	1.25	1.25	1.25	1.25
Milwaukee, Wis.		.86	.86	.96	.96	.96
Minneapolis, Minn.	.35	.35	1.35	1.35	1.35	1.25
Oxford, Mich.	.25– .35	.20– .30	.30– .40	.55– .75	.55– .75	.60– .75
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Urbana, Ohio	.65	.55	.65	.65	.65	.65
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.00	1.00
SOUTHERN:						
Brewster, Fla.	.40	.40				
Charleston, W. Va.	.70	1.25	1.25			
Eustis, Fla.		.40– .50				
Fort Worth, Tex.	1.00	1.00	1.00	1.25	1.25	1.25
Knoxville, Tenn.	.80	1.00	1.50	1.20	1.20	1.20
Roseland, La.	.15	.15	.60	.40	.40	
WESTERN:						
Oregon City, Ore.			Sand for concrete, 1.00-1.50 per cu. yd. at plant			
Phoenix, Ariz.	1.25*	1.15*	1.25*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60		1.20		1.15
San Gabriel, San Fernando Valleys, Cal.	.60	.60	1.10	1.10	1.10	1.10
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.25*

*Cu. yd. ‡Delivered on job by truck. (a) Prices on trucks; on cars, 65c per ton for all sizes.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25	1.50		4.00	
Cheshire, Mass.			Sand for soap, 5.75–7.00			5.00	
Columbus, Ohio	1.50	1.50	1.35	.90		3.50–4.50	
Dresden, Ohio	1.15–1.50	1.00–1.35	1.25–1.50	1.00–1.25	1.25		
Eau Claire, Wis.						2.50–3.00	
Elco, Ill.			Soft amorphous silica, 92%–99% thru 325 mesh, 18.00–40.00 per ton				
Kasota, Minn.							1.00
Montoursville, Penn.				1.35–1.50			
New Lexington, Ohio	1.75–2.00	1.25					
Ohlton, Ohio	1.75*	1.75*	1.75*	2.00*	1.75*	1.75*	
Ottawa, Ill.	1.25–3.25	2.25–3.50	1.25–3.25	1.25–3.25	1.25	3.50	3.50
Red Wing, Minn. (a)					1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50–3.50†	5.00†	3.50–5.00†	
Silica, Va.			Potter's flint 8.00–10.00 per ton				
South Vineland, N. J.			Dry white silica sand, per ton, 2.25				

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio		1.00
Eau Claire, Wis.	4.30	1.00
Montoursville, Penn.		1.00
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25–3.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.		1.75

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass. (in carload lots)	5.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Red Wing, Minn.	1.50
South Vineland, N. J.	1.75
San Francisco, Calif.	4.00–5.00
Silica, Va.	2.50–3.00

Bank Run Sand and Gravel

Algonquin, Ill.¶ (¼-in. and less)	.30
Buffalo, N. Y.—Sand, 1/10-in. down, 1.00; ¼-in. down, .85; gravel, all sizes	.75
Burnside, Conn. (sand, ¼-in. and less)	.75*
Fort Worth, Tex.¶ (2-in. and less)	.70
Gainesville, Tex.¶ (1½-in. and less)	.55
Gary and Miller, Ind.†	1.15–1.40a
Grand Rapids, Mich.¶ (1-in. and less)	.50
Hamilton, Ohio¶ (1½-in. and less)	.50–1.00
Hersey, Mich.¶ ½-in. and less, .40; 1-in. and less	.50
Mankato, Minn.†	.70
Oregon City, Ore.—River run	1.00–1.50
Winona, Minn.†	.60
York, Penn.—Sand, 1/10-in. down, 1.10; ¼-in. and less	1.00

*Cubic yard. †Fine sand, 1/10 in. down. (a) Cubic yard, delivered Chicago. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.92½	3.70	4.30¶
Atlanta, Ga.		2.19*	3.49¶
Baltimore, Md.		2.26*	3.56¶
Berkeley, Calif.		2.14	
Birmingham, Ala.		1.85*	3.15¶
Boston, Mass.	.47	1.88*	3.27¶
Buffalo, N. Y.	.51¼	2.05*	3.35¶
Butte, Mont.	.90¼	3.61	
Cedar Rapids, Ia.		2.23*	
Centerville, Calif.		2.14	
Charleston, S. C.		a2.29†	3.26¶
Cheyenne, Wyo.	.71½	2.86	
Chicago, Ill.		1.95*	3.25¶
Cincinnati, Ohio		2.14*	3.44¶
Cleveland, Ohio		2.04*	3.34¶
Columbus, Ohio		2.12†–2.17*	3.47¶
Dallas, Texas		1.90*	3.49¶
Davenport, Iowa		2.14*	
Dayton, Ohio		2.14*	3.44¶
Denver, Colo.	.76¼	2.95	
Des Moines, Iowa	.48½	2.29*	
Detroit, Mich.		1.95*	3.25¶
Duluth, Minn.		2.04*	
Fresno, Calif.		2.33	
Houston, Texas		2.00*	3.73¶
Indianapolis, Ind.	.54¼	1.99*	3.29¶
Jackson Miss.		2.29*	3.59¶
Jacksonville, Fla.		*2.16–b2.34†	3.46¶
Jersey City, N. J.		2.13*	3.43¶
Kansas City, Mo.	.50½	2.02*	3.22¶
Los Angeles, Calif.	.57½	2.30	
Louisville, Ky.	.55½	2.12*	3.42¶
Memphis, Tenn.		2.29*	3.59¶
Merced, Calif.		2.01	
Milwaukee, Wis.		2.10*	3.40¶
Minneapolis, Minn.		2.27*	
Montreal, Que.		1.60‖	
New Orleans, La.		1.92†	3.22¶
New York, N. Y.	.50¾	2.03*	3.33¶
Norfolk, Va.		1.97*	3.27¶
Oklahoma City, Okla.	.61½	2.46*	3.66¶
Omaha, Neb.	.59	2.36*	3.56¶
Peoria, Ill.		2.12*	3.32¶
Pittsburgh, Penn.		1.95*	3.25¶
Philadelphia, Penn.		2.15*	3.45¶
Phoenix, Ariz.		3.51	
Portland, Ore.		2.50‡	
Reno, Nev.		2.96‡	
Richmond, Va.		2.32*	3.62¶
Sacramento, Calif.		2.25	
Salt Lake City, Utah	.70¼	2.81	
San Antonio, Texas.			3.42¶
San Francisco, Calif.		2.24‡	
Santa Cruz, Calif.		2.10	
Savannah, Ga.		a2.29†	3.16¶
St. Louis, Mo.	.48¾	1.95*	3.25¶
St. Paul, Minn.		2.27*	
Seattle, Wash.		1.50	2.40c
Tampa, Fla.		2.00†	3.41¶
Toledo, Ohio		2.10*	3.50¶
Topeka, Kan.	.55¼	2.21*	3.41¶
Tulsa, Okla.	.58¼	2.33*	3.53¶
Wheeling, W. Va.		2.02*	3.32¶
Winston-Salem, N.C.		2.44*	3.74¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.		2.15	
Bellingham, Wash.		2.25	
Bonner Springs, Kan.		1.85	
Buffington, Ind.		1.70	
Concrete, Wash.		2.65	
Davenport, Calif.		2.05	
Hannibal, Mo.		1.80	
Hudson, N. Y.		2.00	3.30¶
Independence, Kan.		1.85	
Leeds, Ala.		1.70	
Limedale, Ind.		1.70	
Lime & Oswego, Ore.		2.50	
Nazareth, Penn.		2.15	
Northampton, Penn.		1.75	
Richard City, Tenn.		2.05	
Steelton, Minn.		1.85	
Toledo, Ohio		2.20	
Universal, Penn.		1.70	
Waco, Tex.		1.85	

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% cash discount. (a) 44c refund for paid freight bill. (b) 38c bbl. refund for paid freight bill. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo."

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Jamesville, N. Y.	1.00	1.00	1.00	1.00	1.00	.....
Oriskany Falls, N. Y.	1.00	1.25	1.25	1.25	1.25	1.25
Prospect Junction, N. Y.	.50– .80	.....	1.00–1.15	1.00–1.10	1.00–1.10	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	.....	1.75	.....	.....	.....
Afton, Mich.	.....	.....	.....	.25	.....	1.50
Cypress, Ill.	.....	1.00	1.00	.90	.90	.85
Dubuque, Iowa	1.00	1.00	1.00	1.00	1.00	.....
Farmington, Conn. (a)	1.00	1.30	1.30	1.00	1.00	.....
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.00	.90	.90	.90	.90
Lannon, Wis.	.80	.80	.80	.80	.80	.80
McCook, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Sheboygan, Wis.	1.20	1.20	1.10	1.10	.....	.....
Stone City, Iowa	.75	.....	1.10	1.00	1.00	1.00h
Toledo, Ohio	1.60	1.70	.....	1.60	.....	1.60
Toronto, Canada	2.50	3.00	2.50	2.50	2.50	2.50
Waukesha, Wis.	.90	.90	.90	.90	.90	.....
SOUTHERN:						
Cartersville, Ga.	1.15	1.35	1.35	1.15	1.00	1.00
Chico, Texas	.50	1.30	1.25	1.20	1.10	1.00
Cutler, Fla.	.50r	1.75r	1.75r	1.75r	1.75r	1.50r
El Paso, Texas	.50– .75	1.25	1.25	1.00	1.00	1.00
Olive Hill, Ky.	.50–1.00	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.40	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (t)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn.	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35–1.50	1.40–2.10	1.40–1.90	1.30–1.50	1.30–1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Toronto, Canada	4.70	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	.....	.....	1.60	1.60	1.50	.....
Chicago, Ill.—Granite	2.00	1.70	.....	1.50	1.50	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40b
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.25	1.25	1.15	1.15	.....
Lohrville, Wis.—Granite	1.80	1.60	.....	1.50	1.50	.....
Middlebrook, Mo.—Granite	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
San Gabriel and San Fernando Valleys, Calif. (Granite)	.....	1.30	1.30	1.30	.....	1.30
(Basalt)	.....	.....	.....	.85	.....	.....
Toccoa, Ga.—Granite	.50	.....	1.30	1.25	1.20	1.15

(a) Stone 1-in., 1.10 per net ton. (b) Ballast. (c) 1-in., 1.40. (d) 2-in., 1.30. (h) Rip rap. (n) Ballast, R. R., .90; run of crusher, 1.00. (r) Cu. yd. (t) Rip rap, 1.20–1.40 per ton.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Allentown, Penn.	1.00–1.50	.40– .60	.80–1.00	.50– .80	.50– .80	.60– .80	.80
Bethlehem, Penn.	1.25–1.50	.50– .60	1.00	.60– .80	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Reading, Penn.	2.00	1.00	.....	1.00	.....	.....	.....
Swedeland, Penn.	1.50–2.50	.60–1.10	1.00–1.25	.90–1.25	.90–1.25	1.25	1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	.65*	1.80*	1.30*	1.30*	1.30*	.....
Toledo, Ohio	1.50	1.10	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.05*	1.65*	1.45*	1.45*	1.45*	.....
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1½-in. to ¼-in., 1.05; ⅝-in. to 10 mesh, 1.25*; ⅝-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*.

Agricultural Limestone
(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.3% $MgCO_3$, 90% thru 100 mesh 4.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh 1.50
Carterville, Ga. 2.00
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton 6.00
Gibsonburg, Ohio—Bulk, 2.25; in bags 3.70
Jamesville, N. Y.—Bulk, 3.50; in 80-lb. bags 4.75
Joliet, Ill.—Analysis, 50% $CaCO_3$; 44% $MgCO_3$; 90% thru 200 mesh 3.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk 2.50
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton 2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh 4.25
West Rutland, Vt. — Analysis, 96.5% $CaCO_3$; 1% $MgCO_3$, in 100-lb. burlap bags, per ton 4.50

Agricultural Limestone
(Crushed)

Bedford, Ind.—Analysis, 98.44% $CaCO_3$; .83% $MgCO_3$; 90% thru 10 mesh 1.50
Cartersville, Ga.—50% thru 50 mesh 1.50
Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder 3.50
Cypress, Ill. — Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.15; 90% thru 4 mesh, 1.15, and 50% thru 4 mesh 1.15
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton 1.00
Dubuque, Ia.—Analysis, 64.04% $CaCO_3$; 29.54% $MgCO_3$; 50% thru 100 mesh 1.10
Dundas, Ont.—Per ton 1.00
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh; bulk, per ton 1.15
Gibsonburg, Ohio—90% thru 10 mesh 1.00–1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh, sacked 5.00
Lannon, Wis. — Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00
Screenings (¼-in. to dust) 1.00
Marblehead, Ohio—90% thru 100 mesh 3.00
90% thru 50 mesh 2.00
90% thru 4 mesh 1.00
Marlbrook, Va.—Precipitated lime-marl. Analysis, 96% $CaCO_3$; 1% $MgCO_3$, 90% thru 50 mesh, bulk, 2.25; in burlap bags 3.75
McCook and Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .80
Olive Hill, Ky.—90% thru 4 mesh, per ton 1.00
Branchton, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton a5.00
Piqua, Ohio—30%, 50% and 99% thru 100 mesh 1.00–4.00
Rocky Point, Va.—50% thru 200 mesh, bulk, in carloads, 2.00; 100-lb. paper bags, 3.25; 200-lb. burlap bags 3.50
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.25–1.70
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk 100-lb. paper bags, 4.75; 100-lb., cloth 3.50 5.25
Waukesha, Wis.—90% thru 100 mesh, 4.00; 50% thru 100 mesh 2.10
*Less 25c cash 15 days. (a) Less 50c comm.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton 6.00
Hillsville, Penn.—Sacks, 5.10; bulk 3.50
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra) 3.50
Piqua, Ohio—99% thru 100 mesh, bulk, 3.25; in 80-lb. or 100-lb. bags 4.25
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk 4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Bulk	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	11.40	.....	.....	17.50	.....	20.65
Cedar Hollow, Devault, Mill Lane, Knickerbocker, Rambo and Swedeland, Penn.	.....	9.50b	9.50b	9.50b	8.00f	9.50d	8.50	.....
Lime Ridge, Penn.	.....	.....	7.50	.....	6.50	8.00[1]	4.50	.....
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.50	6.50	.....
Cold Springs, Ohio	.....	7.75	7.75	.....	.....	.....	7.00	.....
Gibsonburg, Ohio	10.50	7.75	7.75	.....	7.00	9.00[3]	7.00	.....
Little Rock, Ark.	.....	14.40	.....	14.40	.....	.....	11.90	17.90
Luckey, Ohio*	10.50	7.75	7.75	.....	.....	.....	7.00	.....
Marblehead, Gibsonburg, Tiffin, O., and Huntington, Ind.	10.50	7.75	7.75	11.00	7.00	9.00	7.00	.....
Milltown, Ind.	.....	9.00	8.25	9.50	7.50	.....	7.00	.....
Pittsburgh, Penn.	10.50	7.75	7.75	.....	7.00	9.00	7.00	.....
Scioto, Ohio	10.50	6.50	6.50	7.50	.....	.....	7.00	.....
Sheboygan, Wis.	.....	10.50	10.50	10.50	.....	.....	9.50	20.00e
Wisconsin points	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	10.50	7.75	7.75	11.50[6]	7.00	9.00[3]	7.00	15.00c
SOUTHERN:								
Cartersville, Ga.	.....	9.00	.....	.....	.....	13.50	.....	15.00
Graystone, Ala.*	12.50	9.00	.....	12.50	.....	.....	7.50	.....
Keystone, Ala.	17.00	7.00	.....	7.00– 8.00	5.00g	11.55	5.00a	12.65
Knoxville, Tenn.	.....	.....	.....	.....	5.50	11.55	5.00	12.65
Ocala, Fla.	.....	11.00	11.00	.....	.....	.....	.....	.....
Pine Hill, Ky.	.....	9.00	8.00	7.50–9.00	.....	.....	6.00	12.50
WESTERN:								
Colton, Calif.	.....	.....	.....	.....	9.50[2]	.....	.....	.....
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
Los Angeles, Calif.	22.00	18.00	18.00	18.00	19.00	.....	19.00	21.00
San Francisco, Calif.†	20.00	20.00	12.00	20.00	.....	.....	.....	.....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[5]	.....	11.00[4]	.....

[1]In 100-lb. bags. [2]To 11.85 per ton, granular but not ground, ¾-in. screen down to 14 mesh. [3]In 80-lb. paper. [4]To 14.50. [5]Also 13.00. [6]Superfine, 92.25% thru 200 mesh. *Price to dealers. †Wood-burnt lime: finishing hydrate 20.00 per ton, pulv. lime 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. (a) To 7.00. (b) In 50-lb. paper. (c) In wood; in steel, 16.00. (d) In 80-lb. paper bags. (e) In steel. (f) For chemical purposes. (g) To 7.00.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 200 mesh, 7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton. Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-grey, 6.50 per ton in bulk, plus 10c per bag.

Roofing Slate

City or shipping point	Prices per square—Standard thickness 3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—						
Buckingham oxford grey	13.88	17.22	24.99	29.44	34.44	45.55
Bangor, Penn.—						
Gen. Bangor No. 1 clear	10.00–14.00	20.00	25.00	29.00	40.00	50.00
Gen. Bangor No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
No. 1 Albion	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Gen. Bangor No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
Chapman Quarries, Penn.	7.75–11.25	13.00–15.00	19.00–22.00	23.00–28.00	27.00–30.00	32.00–35.00
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn.						
Graduated slate	.....	16.00	23.00	27.00	37.00	46.00
No. 1 clear (smooth text)	7.25–10.50; Albion-Bangor medium, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Slatedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mt., No. 1 & No. 2 clear	8.00– 9.50	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton 5.00
- Ground talc (20-50 mesh), bags 6.50
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel crayons, gross 1.50– 2.00

Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¾% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh 7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of bags. Terms 1%, 10 days.

Clifton, Va.:
- Ground talc (150-200 mesh), in bags .. 10.00

Conowingo, Md.:
- Crude talc, bulk 4.00
- Ground talc (150-200 mesh), in bags .. 14.00
- Cubes, blanks, per lb. ..... .10

Emeryville, N. Y.:
- Ground talc (200 mesh), bags 13.75
- Ground talc (325 mesh), bags 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh), in 200-lb. bags 15.00–20.00

Henry, Va.:
- Crude (mine run), bulk 3.50– 4.50
- Ground talc (150-200 mesh) in bags 6.25– 9.50

Joliet, Ill.:
- Ground talc (200 mesh), in bags:
  - California talc 30.00
  - Southern talc 20.00
  - Illinois talc 10.00

Los Angeles, Calif.:
- Ground talc (150-200 mesh), in bags .. 15.00–25.00

Natural Bridge, N. Y.:
- Ground talc (325 mesh), bags 10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-70% 3.50– 4.00
Mt. Pleasant, Tenn.—B.P.L. 76-78% 6.75

Ground Rock
(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65-68% 3.50– 4.00
Mt. Pleasant, Tenn.—Lime Phosphate: 85-90% thru 300 mesh 11.80
Mt. Pleasant, Tenn.—B.P.L. 72% 5.00– 5.50

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines
- 68/66% B.P.L. 3.15
- 70% minimum B.P.L. 3.75
- 72% minimum B.P.L. 4.25
- 75/74% B.P.L. 5.25
- 77/76% B.P.L. 6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton 100.00–125.00
- Punch mica, per lb. ..... .06
- Scrap, per ton, carloads 20.00

Rumney Depot, Bristol and Cardigan, N. H.—Per ton:
- Punch mica, per ton 150.00–240.00
- Mine scrap 22.50
- Mine run 325.00
- Clean shop, scrap 25.00
- Roofing mica 37.50
- Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh 60.00

Spruce Pine, N. C.—Mine scrap, per ton 18.00– 20.00

Trenton, N. J.—Mine scrap, per ton, f.o.b. mines 18.00

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

City or shipping point	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton; floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.													
Grand Rapids, Mich.	.....	.....	.....	9.00	9.00	9.00	.....	.....	.....	.....	15.00	15.00	27.00
Los Angeles, Calif.	3.90	10.00	7.00–10.00	8.20	11.70	.....	11.50	10.50	40.00	10.50	.....	22.00	35.00
Medicine Lodge, Kan.	1.40	.....	.....	.....	.....	.....	11.50d	.....	16.00d	.....	.....	.....	.....
Oakfield, N. Y.	3.00	.....	.....	6.00	9.00d	9.00d	.....	6.00	.....	.....	.....	.....	.....
Portland, Ore.	7.50	.....	11.50d	16.00d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Providence, R. I. (x)	.....	.....	.....	12.00–13.00e	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	10.20d	.....	.....	12.90	.....	13.90	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.60	.....	10.00d	14.00d	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00g	33.00f

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (d) Includes paper bags. (e) Includes jute sacks. (f) "Gyproc," ⅜x48-in. by 5 and 10 ft. long. (g) ⅜x48-in. by 3 to 4 ft. long. (x) "Fabricate" gypsum blocks, 2- and 3-in., f.o.b. motor trucks at plant, 7¼c–8¼c. Block setting plaster, per ton, in jute sacks, 12.00. (y) Jute sacks, 18.00; paper sacks, 16.00.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–¶14.50	¶12.50–¶14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, per ton in bags		12.00
Crown Point, N. Y.—Mica Spar		¶9.00–¶12.00
Davenport, Iowa — White limestone, in bags, per ton	¶6.00	¶6.00
Harrisonburg, Va.	12.50–14.50	
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white		¶9.00–¶10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		c5.50
Phillipsburg, N. J.—Royal green granite, in bags, per ton		15.00–18.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N.Y.—Tuckahoe white	6.00	
Warren, N. H. (d)		¶8.00– 8.50

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh, per ton	18.00

Potash Feldspar

Bedford, Va.—Color, white; analysis, K_2O, 12.5%; Na_2O, 2%; SiO_2, 66.5%; Fe_2O_3, 0.08-0.12%; Al_2O_3, 18.5%, crude feldspar, bulk	6.50– 7.50
Keystone, S. D.—Color, white; analysis, K_2O, 12.50%; NaO, 2.25%; SiO_2, 64%; Fe_2O_3, 0.03%; Al_2O_3, 20%, pulverized, 99% thru 200 mesh; in bags, 16.00; bulk	15.00
Crude, in bags, 7.50; bulk	6.50
East Liverpool, Ohio — Color, white; analysis, K_2O, 11.00%; Na_2O, 2.25%; SiO_2, 68.00%; Fe_2O_3, .08%; Al_2O_3, 17.95%, pulverized, 99% thru 200 mesh, in bags, 22.00; in bulk	20.00
Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.75%; SiO_2, 67.75%; Fe_2O_3, .08%; Al_2O_3, 18.00%, pulverized, 98% thru 200 mesh, in bags, 16.00; bulk	15.00
Crude, in bags, 7.50; bulk	6.50

Cement Drain Tile

Graettinger, Iowa — Drain tile, per foot; 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Grand Rapids, Mich.—Drain tile, per 1000 ft.	
4-in.	36.00
6-in.	66.00
8-in.	100.00
10-in.	150.00
12-in.	210.00
Longview, Wash.—Drain tile, per 100 ft.	
3-in.	5.00
4-in.	6.00
6-in.	10.00
8-in.	15.00

Chicken Grits

Cypress, Ill.—(Agstone)	1.15
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack, f.o.b. Chico	1.00
Cranberry Creek, N. Y.—Per ton, in carload lots, in bags, 9.00; bulk, 7.50. Less than carload lots, in bags	12.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
El Paso, Tex.—(Limestone), per 100-lb. sack	.75
Los Angeles, Calif.—(Gypsum), per ton, including sacks	7.50– 9.50
Middlebury, Vt.—Per ton (a)	10.00
Piqua, Ohio—(Pearl grit), No. 1 and No. 2	1.00– 4.00
Port Clinton, Ohio—(Gypsum), per ton	6.00
Randville, Mich.—(Marble), bulk	6.00
Seattle, Wash.—(Gypsum), bulk, ton	10.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	‖7.50–‖9.00
Wisconsin points—(Limestone), per ton	15.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. (at plant)	9.50
Dayton, Ohio	12.50
Detroit, Mich.	12.00¶–15.50*
Farmington, Conn.	16.00
Flint, Mich.	15.50‡
Grand Rapids, Mich.*	14.00
Iona, N. J.	10.50–12.00
Jackson, Mich.	13.00
Madison, Wis.	12.50†
Milwaukee, Wis.	12.00–13.00*
Minneapolis and St. Paul, Minn.	9.50*
Mishawaka, Ind.	11.00
New Brighton, Minn.	9.00
Pontiac, Mich.	10.00–11.00
Saginaw, Mich.	13.50
San Antonio, Texas	12.00
Schewaing, Mich. (at yard)	12.50
South River, N. J.	11.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	11.00–‡13.00*
Wilkinson, Fla.—White, 10.00; buff	14.00
Winnipeg, Canada	15.00

*Delivered on job. †Less 50c dis. per M 10th of month. ‡5% disc., 10 days. §Delivered in city. ¶To 13.00.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Appleton, Minn.	18.00–20.00
Franklin Park, Ill.:	
8x8x16. Per 1000	180.00
Camden, N. J.: 8x8x16, each	.18
Chicago, Ill.:	
8x 8x16. Each	.21†
8x 8x16. Each	.18§
8x10x16. Each	.25†
8x10x16. Each	.22§
8x12x16. Each	.28†
8x12x16. Each	.25§
Columbus, Ohio: 8x8x16	14.00§–16.00†
Forest Park, Ill.	21.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12‡
Lexington, Ky.:	
8x8x16	‡18.00*
8x8x16	§16.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*

*Price per 100 at plant.
†Rock or panel face.
‡Face. §Plain.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—French, Spanish, Closed End Shingle, and English Shingle, per sq.	9.50–13.00
Detroit, Mich.—5x8x12, per M	67.50
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.:	
Red	15.00
Green	18.00
Longview, Wash.:	
4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00

Cement Building Tile

Chicago District (Haydite):	
8x 4x16, per 1000	140.00
8x 8x16, per 1000	200.00
8x12x16, per 1000	300.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Lexington, Ky.:	
5x8x12, per 1000	55.00
4x5x12, per 1000	35.00
Longview, Wash. (Stone Tile):	
4x6x12, per 1000	57.50
4x8x12, per 1000	65.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Camden & Trenton, N. J.	17.00	
Chicago District "Haydite"	14.00	
Columbus, Ohio	16.00	17.00
Ensley, Ala. ("Slagtex")	10.00a	
Forest Park, Ill.		37.00
Longview, Wash.	16.50	23.00– 40.00
Milwaukee, Wis.	14.00	
Omaha, Neb.	18.00	30.00– 40.00
Philadelphia, Penn.	15.50	
Portland, Ore.	12.00	22.50– 55.00
Prairie du Chien, Wis.	14.00	22.00
Rapid City, S. D.	16.00	30.00

(a) 13.00 delivered on job in city.

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00

Stone-Tile Hollow Brick

Prices are net per thousand, f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.		53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.		55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans La.	35.00	45.00	60.00
Norfolk Va.	35.00	50.00	65.00
Passaic, N. J.	40.00	52.50	70.00
Patchogue, N. Y.		60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

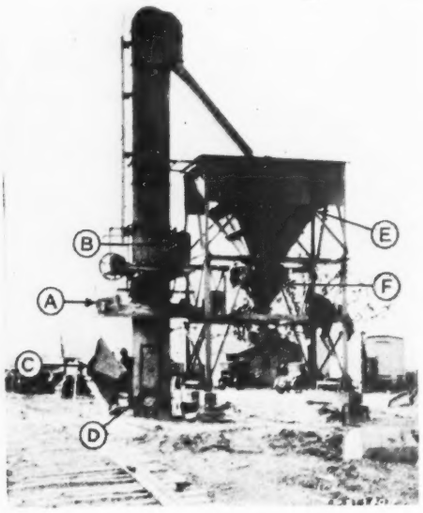
Culvert and Sewer	4-in.	6-in.	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich. (b)																	
Sewer	.....	.12	.18	.27½	.35	.47	.92½	1.11	.....	1.66½	2.47	2.73½	.....	.....	.....	.....	.....
Culvert	.....	.....	.....	.57	.67	.93	1.20	.....	.....	1.80	2.10	2.25	3.35	4.00	5.60	6.90	7.85
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Newark, N. J. (d)	.....	.....	.....	.....	.90	1.15	1.50	.....	.....	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	.....	.16	.25	.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Wahoo, Neb. (c)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31

(a) 24-in. lengths. (b) Sewer, 21-in., 1.48; culvert, 21-in., 1.45. †21-in. diam. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced, 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount.

New Machinery and Equipment

Handling and Batching Plant for Bulk Cement

THE BLAW-KNOX CO., Pittsburgh, Penn., announces a complete handling and batching plant for bulk cement. The complete plant arrangement is made up of the following units, illustrated in the accompanying photograph—power shovel (*A*)



Complete plant for handling and batching bulk cement

driven by a 15 hp. gasoline engine (*B*) removes cement from railroad cars and deposits it into a folding boot extension (*C*) which empties into bottom of vertical elevator (*D*) which discharges into a 21-ton self-cleaning steel cement bin (*E*). The weighing batcher (*F*), an integral part of the steel bin, receives cement through a series of manually operated gates, from which it is deposited into a 10-in. diameter canvas tube, this tube terminating in a countered sheet metal bell, which spreads the cement on top of a truck-load of previously loaded aggregates.

According to the manufacturers, the plant is variable as to capacity, and conveyor discharge for special cement cars can also be furnished.

New Six Cylinder Truck

DESIGNED for heavy duty service where greater speed and power is essential, the new Model AK 6, illustrated here, is the latest addition to the line of four- and six-cylinder trucks manufactured by Mack Trucks, Inc., New York City.

The new truck retains the "Bulldog" type hood and can be had with either a covered or couple type cab. It is powered by a six-cylinder engine, with bore and stroke of 4½ in. by 5½ in., and develops 126 hp. at 2200 r.p.m. Pistons are of aluminum and of the invar strutted type; connecting rods are tubular and the cylinders are cast in block.

Smooth running at all speeds, claims the manufacturer, is assured by the use of a case-hardened, drop forged crankshaft which has integral counterweights and a vibration damper. The valves are flat seated, of L-head type and are located at the right. Lubrication is of the force feed and splash type used on other Mack models, and all oil is filtered through an H. W. filtrator. Water circulation is by centrifugal pump, the temperature being controlled by a thermostat.

Transmission has four speeds forward and one reverse and is driven by a single-plate, dry type clutch.

Final drive is by either chain or enclosed gears. The enclosed drive is of the dual reduction type—full-floating, with each gear assembly readily and independently accessible without jacking up the axle or disturbing the wheels or brakes. A 45-deg. tilt to the banjo type axle, which it is stated is an exclusive feature, augments its strength and renders good road clearance. The chain drive used on this model is the same type as used on other Mack AC Bulldog trucks.

Steering is of the worm and nut type, and the special construction of the steering knuckle, it is claimed, greatly reduces steering effort and minimizes the effect of front wheel braking upon the steering. The front axle is of the reversed Elliot type with center point steering.

Expanding type brakes are on all four wheels, in two independent sets, the foot brakes being vacuum booster actuated, and the hand lever operating a secondary set on the driveshaft, thus assuring absolute safety at maximum speed.

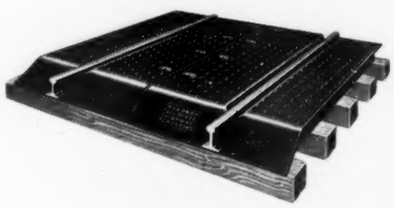
New six cylinder truck for heavy duty service

New All-Steel Highway Crossing

A HIGHWAY CROSSING made entirely of steel, which it is claimed will withstand the heaviest traffic loads indefinitely, has been placed on the market by Joseph T. Ryerson and Son, Inc., Chicago, Ill.

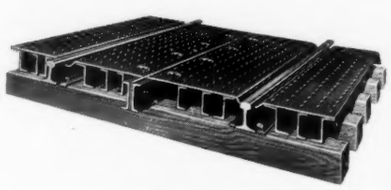
It is made of ¼-in. steel plates, firmly riveted to steel channels and zees.

An important feature is the ease with which it is installed; it is said that four men will put in an 8-ft. section in less than a half hour. First the outer plates are secured by placing the ends under the ball of the rail and locking them to the rail by means of rail clips and anchor rods. The



Steel highway crossing built to withstand heavy traffic loads

center beam is spiked firmly into the ties, and the two center plates are then placed in position by slipping their flangeways under the ball of the rail. Installation is completed by fastening the center plates with a



Showing construction of steel highway crossing

patented locking device, thus holding the crossing rigidly in place regardless of traffic strain. Where installation requires the two rails to be electrically insulated from each other, two rolled steel channels are bolted together with a 1-in. creosoted wood strip in between. The bolts are provided with fiber bushings and washers. These bolted channels are then spiked midway between the rails in place of the center I-beam. The ends of the crossing are bent downward to the ground to prevent dangling chains or air hose from catching in the crossing, and ample circulation of air insures against rotting of the ties.

Vacuum Tube Measuring Small Electric Currents

A NEW TYPE of vacuum tube has been developed by the General Electric Co. which, it is stated, will to a great extent replace electrometers now used in the measurement of very small electric currents.

This new tube will measure accurately a flow of 63 electrons per second, or a hundredth of a millionth of a billionth of an ampere (10^{-17} ampere). An idea of its sensitiveness to infinitesimal currents is further conveyed when it is considered that the current flowing in an ordinary 50-watt incandescent lamp is 50 million billion times as great as this. Besides its greater sensitivity it has much greater ease of mounting.

One of its major applications will be in the laboratory measurement of currents in ionization chambers which are used to indicate the intensities of x-ray and ultraviolet light beams. Another important application will be in the photoelectric measurement of stellar intensities, where it can be used with photoelectric tubes to determine the heat radiated by stars and thus their distance away with much greater sensitiveness and accuracy.

The currents produced may be amplified and made to operate relays or control equipment, which is impossible with the present electroscope or electrometer. It has a current amplification factor a million times that of the ordinary radio tube.

Pneumatic Conveyor for Unloading Bulk Cement

HOLLY PNEUMATIC SYSTEMS, Inc., New York City, has installed an unusual bulk cement unloading system at the plant of the Carleton Co., Inc., Brooklyn, N. Y. The arrangement for receiving and handling bulk cement at this plant is shown in the accompanying diagram.

Cement arrives in barges which can be placed on either the side or the end of the dock. A suction nozzle is attached to one end of flexible hose and the other end is connected to rigid conveyor pipe which runs along the ground near the edge of the dock. Service valves permit of easy attachment of the flexible hose. Cement entering the suction nozzle in the boat is drawn through the flexible hose and conveyor pipe into the filter recipient. Discharger on the bottom of the filter recipient continuously ejects cement which drops directly into the cement storage bin. Cloth bags in the filter recipient collect dust before the air passes out through the top to the vacuum pump, which is on the ground.

No manual labor is involved in the operation except at the suction nozzle in the boat. Cloth bags in the filter recipient are automatically cleaned every few minutes without disturbing the operation in any way, the collected dust being discharged with the bulk of the material.

Advantages claimed for this system are the saving in the price of bulk cement as compared to bag shipments, the elimination of handling and salvaging of empty bags, that there is no loss of cement at any point and the nuisance of dust around the plant getting into the bearings of machinery is eliminated, and that yard space is left free for other uses.

Over 60,000 bbl. of cement has already been handled by this system at the Carleton plant, and according to the manufacturer it has been found satisfactory in every particular.

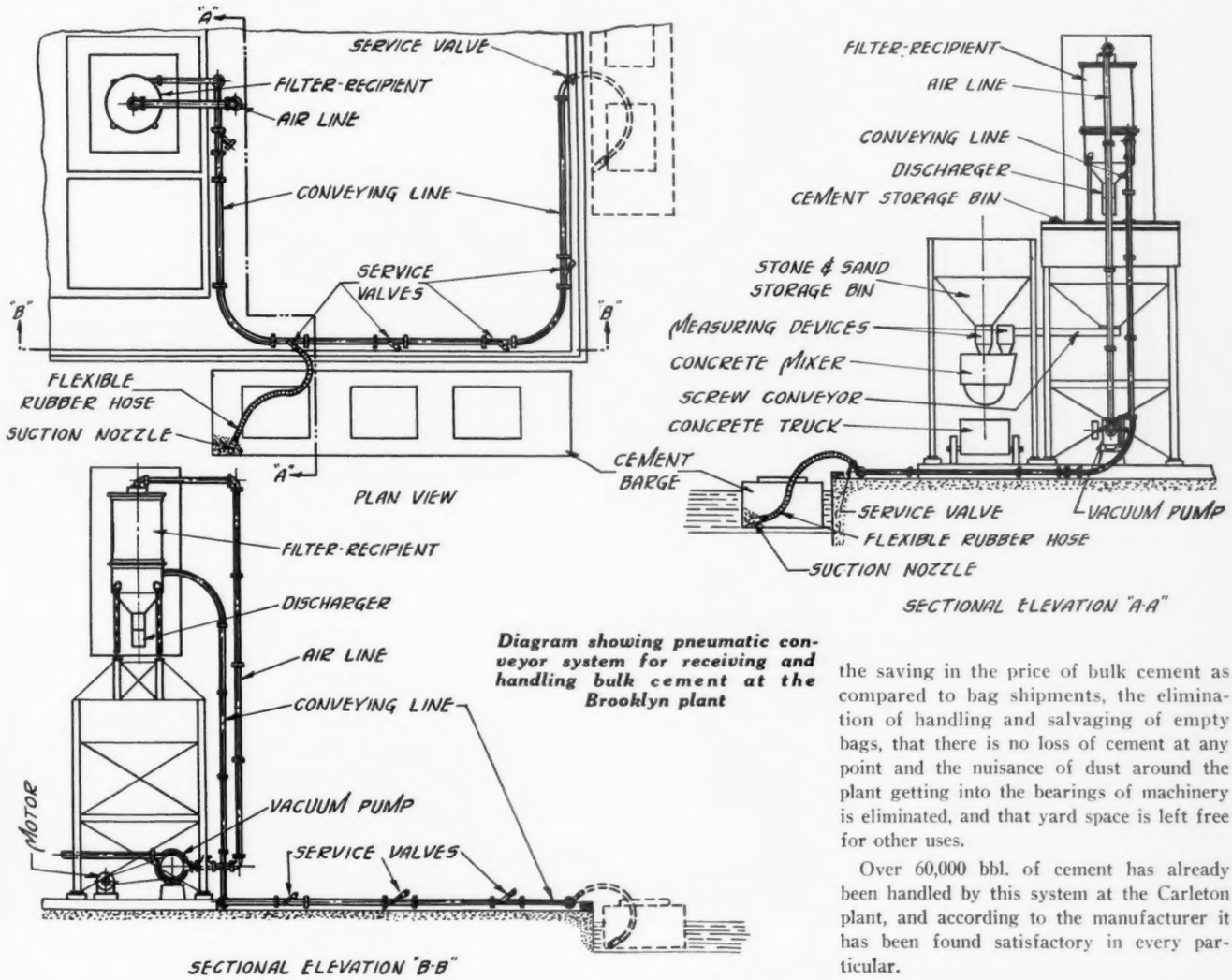


Diagram showing pneumatic conveyor system for receiving and handling bulk cement at the Brooklyn plant

Portable Unloading Pump for Cement and Other Materials

THE FULLER CO., Catasauqua, Penn., has developed a portable unloading pump which is similar in principle and operation to the stationary Fuller-Kinyon pumps manufactured by this company.

The cement or other pulverized material packed solidly due to transportation

Unloading and handling cement in bulk with pump

by rail is broken down by a perforated single-disc feeder and fed by a differential pitch screw in the barrel of the pump. This screw has the dual function of compacting the cement to form a seal to prevent the escape of air admitted beyond the terminal flight, and to pump the material to the point or points of delivery after it has been made fluent by the injection of air. Delivery may be made to several bins under the control of two or three-way diverting valves. These valves may be operated automatically or by remote control, if desired. The bins may be provided with high level signals, which may also operate diverting valves. Power is supplied by built-in motor, the rotor of which is keyed to a bushing surrounding the screw shaft. The screw shaft is released for renewal or repair by the removal of a single jam nut, thus preventing delay at the mixer in case of accident to the pump.

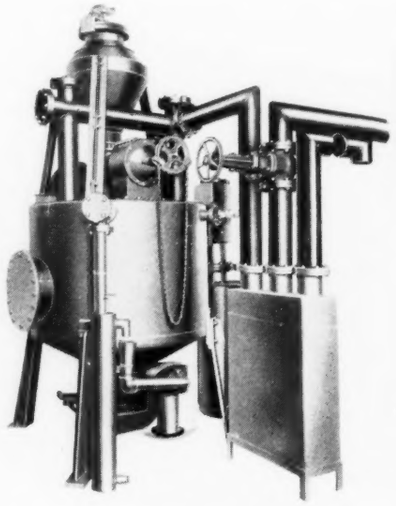
Large castings are made of aluminum to reduce weight, and all parts subject to wear are quickly removable.

According to the company the new unloading pump has conclusively demonstrated its working qualities. Slightly less than 30,000 bbl. of cement was conveyed by this system without a major repair in the construction of approximately 7 miles of state highway in Lebanon county, Pennsylvania. The average rate of unloading, including the time for opening car doors, removing bulkheads and cleaning up the car, varied between 80 and 90 bbl. per hour. With electric current at 2c per k.w.h. and labor at 50c per hour, the estimated cost of unloading is 1½c per bbl.

Acetylene Generators

TWO IMPROVED types of non-automatic stationary acetylene generators for supplying large volumes of acetylene have been developed by the Oxweld Acetylene Co., New York City. These generators, which are each made in two sizes having 500 lb. and 1000 lb. carbide capacity, are designed for large industrial plants where oxwelding and cutting are used extensively and where oxygen and acetylene are piped to stations convenient to operators.

The Oxweld Type NA-3 acetylene generator, shown in the illustration, is for plants using low-pressure welding and cutting apparatus, and delivers to a storage holder which is weighted to supply acetylene to the shop piping system at pressures not to exceed the permissible limit of 15 lb. per sq. in.

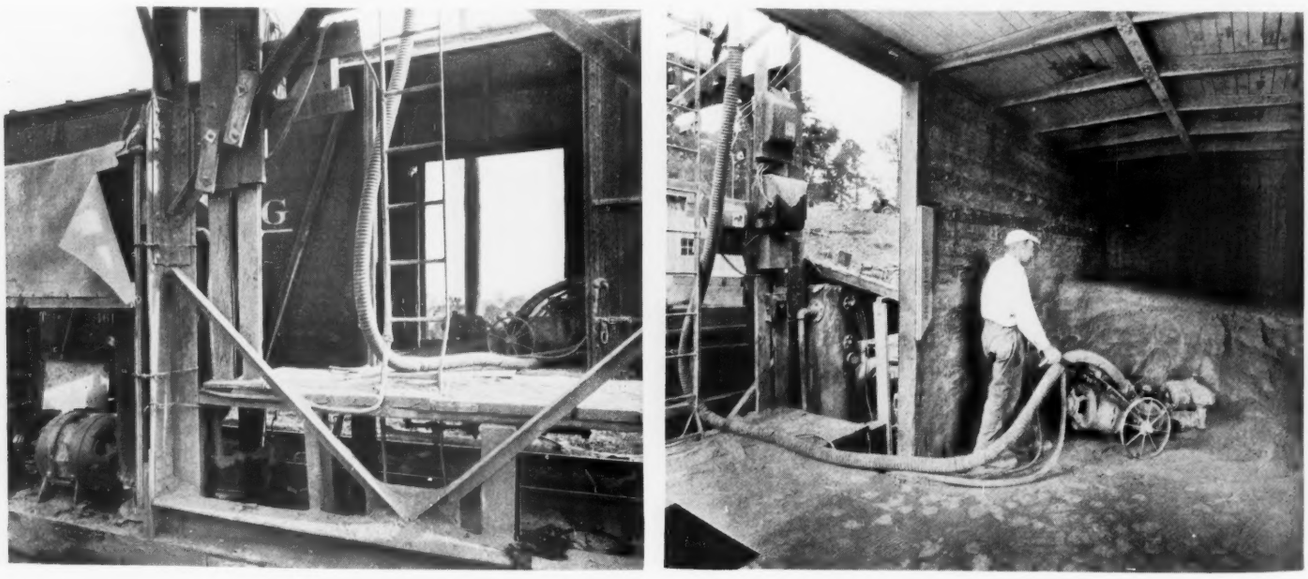


Acetylene generator for plants using low-pressure welding apparatus

The booster system consists of a booster pump, pressure regulating, by pass valve, pulsation tank, mercury seal, hydraulic back pressure valve, electric motor for driving the booster and power transmission equipment. The booster unit may be had with a capacity suitable for the particular installation.

Gilman Manufacturing Co. Acquired By Worthington

WORTHINGTON Pump and Machinery Corp., New York City, announces that it has acquired the Gilman Manufacturing Co., East Boston, Mass., manufacturing a line of rock drilling equipment, to supplement its line of Worthington Feather Valve air compressors.



Details of portable pump for unloading and handling bulk cement on construction job

Pertinent Paragraphs

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Interesting items from everywhere condensed and "abstracted" for the benefit of busy readers

By Hugh Sharp

WHILE Idaho contains large deposits of high-grade phosphate rock and boasts of one of the largest plants for the manufacture of treble superphosphate, its farmers seem most reluctant to apply latest fertilizing methods if the radio talks and newspaper articles emanating from its agricultural experts are any criterion.

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AN INSTANCE of where the combination of Napoleon and Waterloo did not signify defeat is in the new 750-ft. concrete bridge recently dedicated at Napoleon, Ohio. A contractor from Waterloo, Iowa, built the span. The concrete was placed in 14 below zero conditions. Aviators will be pleased with the innovation of having the name of the town set in colored brick in the pavement. A 50-year-old bridge had to be moved to one side to serve traffic during the 19-month construction period.

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ON LAST MONDAY there was dedicated in Schenley Park, Pittsburgh, a magnificent memorial to George Westinghouse, erected by some 55,000 employes of the various Westinghouse industries. His contributions to science in the form of alternating electric current, the air brake, railroad switching and signaling system, the system of distributing natural gas and the turbine-generator were the foundation on which has been constructed one of the world's greatest enterprises. It seems entirely fitting that, 16 years after his death, this splendid shrine should be set apart to the memory of George Westinghouse, a man of vision and indomitable courage. The central figure is that of an American boy.

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THE IMPORTANCE of the Sixth International Road Congress in Washington, D. C., October 6 to 11, can be seen in the number of delegates representing various countries and the unusual number of countries represented. In his radio address welcoming the road engineers, Roy Chapin, head of the American organizing commission for the congress, said that there were in attendance more than 100 prominent British highway administrators, some 50 from France and 30 each from Italy and Germany. Almost without exception every country on the globe sent delegates.

GRINDSTONES made from Ohio sandstone were used as means for exchange for groceries, dry goods and other necessities of life in 1808, according to an old book, written in 1867 by Col. Charles Whittlesey around the early history of Ohio. This seems to establish sandstone as one of Ohio's first industries and most everyone knows of the popularity of that state's sandstone, used extensively in building projects all over the country. The first plant of record producing sandstone on a commercial scale was organized 25 years ago at Amherst, Ohio, the Ohio Cut-Stone Co. Today Ohio ships something like 10,000 carloads of sandstone, some 3,000,000 cu. ft.

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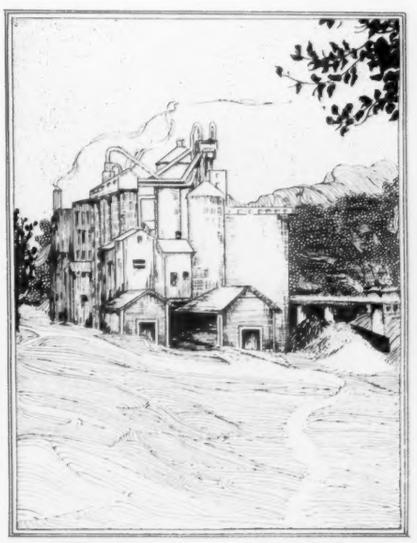
THE plant of the American Lime and Stone Co. at Bellefonte, Penn., furnished the inspiration for an attractive book-plate for Samuel M. Shallcross, vice-president and general manager of the plant. The etching



from which this book-plate was designed is the work of Miss Kathryn V. Shallcross, a sister, who was, at the time the sketch was made, a student at the School of Design for Women in Philadelphia. "On a foggy morning our plant looms like a castle in Spain," says Mr. Shallcross.

PROBABLY, you remember Homer Sink, spoken of in these columns as being able to sink his husky hands into 3000 bags of cement every day. Now comes Gordon Tongue, sales manager of Superior Portland Cement, Inc., at Seattle, Wash., to tell us of a crew of three men in his plant that packed and placed in cars 9309 sacks weighing 884,355 lb. in 8 hours, something like 442 tons. The names of these heavy hustlers are Roy Clifford, Walter Jungbloom and Andy Azzola. "We believe this is a record that will stand for some time," says Mr. Tongue.

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WE'VE HEARD of prison labor in quarries and highway construction but the latest bit of news comes from Pontiac, Mich., where the county has placed at the disposal of recalcitrant individuals a cement block plant. They have just extended to a former chief of police of Berkley an opportunity to learn something of the intricacies of the trade in exchange for sundry alimony dues. During his year's training his family will benefit to the tune of $15 a week.

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AN OLD LIME KILN which must have been constructed between 100 and 150 years ago has been found intact in the side of a hill near Beaver Creek valley, south of Moran, Iowa. When opened it was found to contain a large quantity of lime, some traces of wood and ashes and a quantity of limestone. Many fanciful stories are being built around this discovery, as some of the descendants of early Irish settlers in Iowa remember instances of whole families being wiped out by Indians while they were building their homes. The remains of the kiln are of such historic interest that samples of the lime, rock and charred wood were displayed in the windows of a newspaper in Woodward.

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ENGLAND, the great empire builder, is having troubles. So serious has the problem become of settling the vast empty spaces of British soil where the sun never sets that the authorities are suggesting turning the land over to the Italians, Slavs, Czechs and others. One writer laments thusly: "Can it be that the present generation of Britishers are not worthy of their forefathers who painted one-fourth of the globe red?" And the isle continues to become tighter with overpopulation.

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NEW YORK'S well known stone foundation has been used to advantage for a new and unique restaurant underneath the Lincoln Building on East 42nd Street, 35 ft. below street level and hewn out of solid rock. Ventilation is provided through intakes from the top of the Lincoln Building. The new eats emporium will be known as the Dungeon.

News of All the Industry

Incorporation

Nebraska-Iowa Sand and Gravel Co., Omaha, Neb., $25,000.

Smithtown Sand and Gravel Co., Smithtown, N. Y., $10,000. C. B. Partridge, Northport, N. Y.

Pilot Butte Sand and Gravel Co., Ltd., Pilot Butte, Sask., Canada.

Elk River Concrete Products Co., Helena, Mont., $50,000. Earl H. Eby, S. T. Noland and Leon H. West.

Amarillo Retail Sand and Gravel Co., Amarillo, Tex., $2,000. To buy and sell sand. S. F. Sullenberger, S. M. Sullenberger and E. D. Moore.

Wyckoff Sand and Gravel Co., Wyckoff, N. J., $125,000. J. W. Kehoe and E. A. Kehoe, Paterson, N. J.

Artex Products Corp., Milwaukee, Wis., 200 shares of no par value. To produce and deal in cement, lime, plaster, gravel, etc. M. Libow, H. Brown and C. D. Ashley.

Lynn Sand and Stone Co., Swampscott, Mass., $300,000, consisting of 3000 shares at $100 each. Theodore C. Cooke, Swampscott, Mass., Harry W. Kummel and William D. Manchester.

Yazoo Portland Cement Co., Vicksburg, Miss., 25,000 shares of 7% cumulative preferred stock, par value $100 per share, 100,000 shares of no par common stock. R. S. Clark and R. C. Link, Memphis, Tenn., H. C. McCabe, Vicksburg, Miss.

Industrial Brick and Sand Co., Providence, R. I., $100,000 and 2000 shares no par common stock. To deal in building materials. John E. Canning, Edward M. Brennan and Andrew P. Quinn of Providence.

Jackson Apartments Corp., Jackson, Mich., $50,000 and 150,000 shares of no par value. To engage in quarrying and real estate business. G. M. North, Jr., M. R. Hulliberger and A. C. Moller, Jackson.

Quarries

Artstone Quarries Co., Etowah, Tenn., has opened a rock quarry at Crossville, Tenn.

Utah Rock Asphalt Co. closed its season's operations at the quarries above Sunnyside, Utah.

Eugene Keller of Louisiana, Mo., has purchased an old quarry at Grafton, Ill., and it will be reopened soon.

Le Grand, Ia. The Northwestern Quarry here closed its operations for the season. **The Le Grand Limestone Co.** will continue operations indefinitely, it is reported, producing road material and ballast.

B. E. Townsend and **Paul T. Boise** of Salt Lake City, Utah, recently inspected the limestone deposits of Tuolumne county with a view to establishing a plant. It is understood that negotiations were entered into for acquiring a 160-acre tract of land four miles south of Sonora, Calif.

Willford Crushed Stone Co.'s plant at Hardy, Ark., is now running at full capacity and is employing about 35 men. The plant, which was idle for two years prior to two months ago, has enough orders to keep it operating until late this fall, according to reports.

Orange, Ind. A fire which started from an overheated oil-burning engine recently caused damage estimated at $4,500 at the George and Emsweller stone crushing plant on the John R. Gray farm north of Orange. The loss is covered by insurance. The company, which is providing stone for the Johnson road south of Orange, expects to resume operations at the plant soon.

Sand and Gravel

Keener Sand Co.'s plant near Gallipolis, Ohio, was damaged to the extent of several thousands of dollars by a fire which occurred on September 26.

The Capital Coal and Wood Co., Regina, Sask., Canada, has sold its gravel pit to C. Oulette, contractor.

Cumberland River Sand Co., Nashville, Tenn., is making rapid progress in the construction of eight conveyors and 19 steel storage bins for gravel. The estimated cost of the installations is $125,000.

Independent Sand Co., Wichita, Kan., has opened a new sand pit at Sterling, Kan. The plant will produce 25 carloads per day when operating at full capacity.

Blaine Ottis is operating a new gravel plant at Yosemite Junction below Jamestown, Calif. W. E. Anderson is associated with Mr. Ottis in the project.

Granite Falls, Minn. The county board recently agreed to sell the county's one acre plot of ground in south Granite Falls as the location for a sand and gravel operation to produce materials for the rerouting of highway No. 12. It is reported that the company interested in the establishment of the plant is taking up options on property at various points along the proposed route of the new highway and intends to furnish the state with gravel and sand for paving when the construction work begins.

Cement

Southwestern Portland Cement Co. has moved its general offices to 503 Roosevelt Bldg., 727 West Seventh street, Los Angeles, Calif.

Missouri Portland Cement Co.'s plant at St. Louis, Mo., was recently inspected by members of the Engineers Club of St. Louis.

International Portland Cement Co., Spokane, Wash., is operating its mill at Irvin, Wash., and its quarry in Stevens county on a special fall run, in preparation for increased demand for its product due to expansion in construction work in the locality.

Yazoo Portland Cement Co., Vicksburg, Miss., incorporation notice of which appears in this issue, is planning to establish a cement plant utilizing rock deposits on the east bank of the Mississippi river, north of Vicksburg. R. T. Miller of Nashville, Tenn., formerly general manager of the Cumberland Portland Cement Co., Cowan, Tenn., is reported to be interested in the project.

Agricultural Limestone

Floyd, Ia. The agricultural limestone plant just north of Floyd has started operations and is supplying agricultural limestone to farmers at $1.60 a ton at the quarry.

Morris Limestone Products Co., Morris, Ill., has just installed a new crusher with a capacity of 100 tons per day. The company is specializing in the production of agricultural limestone.

Waverly, Ia. A new limestone crusher, to crush over two carloads of limestone per day, is to be installed at the Colburn quarry in East Lafayette township. Demand for agricultural limestone for soil purposes in this vicinity has necessitated installation of the larger crusher.

River Products Co., Iowa City, Ia., shipped a trainload of agricultural limestone to Washington county farmers recently. The train carried 771 tons of limestone, and the company is to ship another trainload to farmers along the Rock Island line near Solon, Ia. J. F. Sproatt, general manager of the company, is working on the project in cooperation with County Agent S. Lyle Duncan.

Miscellaneous Rock Products

American Cyanamid Co., New York City, will soon start the erection of a new super-phosphate plant near Tampa, Fla., where work has been under way on a dock and shipping terminal. The initial plant will include power house, machine shop and other mechanical departments and will cost over $3,000,000. The project will include storage facilities, conveying and other equipment for distribution of raw phosphate rock.

Personals

P. R. Chamberlain, superintendent of the Dewey Portland Cement Co., Dewey, Okla., has been nominated for vice-president of the Bartlesville Engineers' Club, Bartlesville, Okla.

J. T. Skelly, vice-president of the Hercules Powder Co., Wilmington, Del., addressed the National Safety Council at its recent meeting at Pittsburgh, Penn., on safety in blasting operations.

Professor James R. Withrow of the Ohio State University chemical engineering department has been made a member of the advisory committee C-7 on lime manufacture for the American Society of Testing Materials, Philadelphia, Penn.

C. B. Randall, formerly of Ishpeming, Mich., has been elected president of the Inland Lime and Stone Co., Manistique, Mich. He succeeds the late David Thompson. Mr. Randall is also a vice-president of the Inland Steel Co.

Joseph J. Kelly, who has been works manager of the Gypsum, Ohio, plant of the United States Gypsum Co., has been transferred to the Oakfield, N. Y., mill in the same capacity. He will succeed Edgar R. Hill, who has been transferred to Chicago.

Hans Mumm, Everett, Wash., president of the Everett Concrete Products Co., is a candidate for the state senate. Mr. Munn was formerly county and city engineer of Everett and one of his campaign policies is the recommendation for improved highways in the state.

Elwood F. Meschter is now associated with Sprout, Waldron and Co., Inc., at Muncy, Penn., as sales manager of the material handling division of their business. He was formerly associated with the Link-Belt Co., Philadelphia, and for the past 13 years with Gifford Wood Co., Hudson, N. Y., in a sales and engineering capacity.

Harry T. Gilbert, vice-president in charge of sales of Republic Steel Corp., Youngstown, Ohio, has been named special assistant to the president of the company. Norris J. Clarke, formerly vice-president of Lamson and Sessions, has been named vice-president in charge of sales of Republic, succeeding Mr. Gilbert.

F. O. Wyse, advertising manager of Bucyrus-Erie Co., South Milwaukee, Wis., spoke at a session of the Employes' Publication Section of the National Safety Council at its recent meeting in Pittsburgh. The subject of his discussion was "Editing the News-Letter." Mr. Wyse is editor of "The Scoop," which is published by Bucyrus-Erie.

Charles Gulick of the engineering department of the College of the Pacific gave a talk on the condition of the cement industry before members of the Stockton Engineers' Club, Stockton, Calif., recently. Mr. Gulick has been associated with a large cement company at Colton, Calif., for the last two years and has a wide knowledge of the industry. He gave a very comprehensive and interesting talk.

David B. Reger has resigned his position as associate geologist of the West Virginia Geological Survey and has opened an office as consulting geologist. He will practice in the geology of the hydrocarbons and nonmetallics, giving special attention to reports and appraisals on coal, oil and gas properties and to the utilization of earthy materials and mineral waste products. His office is to be located at 217 High St., Morgantown, W. Va.

P. J. Freeman, chief engineer of the Bureau of Tests and Specifications, Department of Public Works, Allegheny county, Pittsburgh, Penn., has been elected chairman of Committee D-4 on Road and Paving Materials of the American Society for Testing Materials. **A. T. Goldbeck**, director of the Bureau of Engineering of the National Crushed Stone Association, Washington, D. C., has been elected vice-chairman of this committee.

John S. McMillin, president of the Roche Harbor Lime and Cement Co., Roche Harbor, Wash., recently invited members of the Tacoma Ambassadors' Club and other interested citizens of Tacoma to witness a showing of motion pictures of the recent Roche Harbor annual harvest festival, staged by Mr. McMillin in sumptuous manner at his island home, as well as many other amateur films of local scenes and travelogs of Washington, D. C., Yorktown, Penn., Mount Baker, Honolulu and other places of interest.

R. S. Wright has been appointed European representative of Gypsum, Lime and Alabastine, Ltd., Paris, Ont., Canada. Mr. Wright, who for some years was engaged in the architectural research department, is a former engineer of the Ontario Department of Public Works, and will be principally concerned in Europe with acoustical and insulation engineering. He will make his headquarters in London. **H. H. Phillips**, export manager of the company, is making a business trip to Europe and will sail on the "Duchess of York" with Mr. Wright. Following the European trip Mr. Phillips will go to South Africa.

Obituaries

Benjamin Huger Heyward, general manager of the Winnsboro Granite Corp., Dillon, S. C., was accidentally killed at one of the quarries recently. As manager of the Winnsboro Granite Corp. for twenty-seven years, he enjoyed a nationwide reputation in this industry, and was made president of the American Granite Producers' Association.